

PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XLI—No. 2

FEBRUARY, 1915

Edited by the Secretary, under the direction of the Committee on Publications.

Reprints from this publication, which is copyrighted, may be made on condition that the full title of Paper, name of Author, page reference, and date of presentation to the Society, are given.

CONTENTS

Society Affairs.....	Pages 63 to 148.
Papers and Discussions.....	Pages 247 to 530.

NEW YORK 1915

Entered according to Act of Congress, in the year 1915, by the AMERICAN SOCIETY OF CIVIL ENGINEERS, in the office of the Librarian of Congress, at Washington.

American Society of Civil Engineers

OFFICERS FOR 1915

President, CHARLES D. MARX

Vice-Presidents

Term expires January, 1916:

CHARLES F. LOWETH
GARDNER S. WILLIAMS

Term expires January, 1917:

DANIEL BONTECOU
CLEMENS HERSCHEL

Secretary, CHARLES WARREN HUNT

Treasurer, LINCOLN BUSH

Directors

Term expires January,
1916:

JAMES H. EDWARDS
HENRY W. HODGE
LEONARD METCALF
HENRY R. LEONARD
EDWARD H. CONNOR
SAMUEL H. HEDGES

Term expires January,
1917:

GEORGE W. FULLER
ARTHUR S. TUTTLE
CHARLES H. KEEFER
MORTIMER E. COOLEY
EUGENE E. HASKELL
RICHARD MONTFORT

Term expires January,
1918:

JOHN V. DAVIES
GEORGE A. HARWOOD
J. E. GREINER
JOHN F. COLEMAN
JOHN B. HAWLEY
HERBERT S. CROCKER

Assistant Secretary, T. J. MCINN

Standing Committees

(THE PRESIDENT OF THE SOCIETY IS *ex-officio* MEMBER OF ALL COMMITTEES)

On Finance:

HENRY W. HODGE
CLEMENS HERSCHEL
GEORGE W. FULLER
LEONARD METCALF
JOHN F. COLEMAN

On Publications:

JAMES H. EDWARDS
ARTHUR S. TUTTLE
J. E. GREINER
HENRY R. LEONARD
GARDNER S. WILLIAMS

On Library:

GEORGE A. HARWOOD
JOHN V. DAVIES
HERBERT S. CROCKER
M. E. COOLEY
CHAS. WARREN HUNT

Special Committees

ON CONCRETE AND REINFORCED CONCRETE: Joseph R. Worcester, J. E. Greiner, W. K. Hatt, Olaf Hoff, Richard L. Humphrey, Robert W. Lesley, Emil Swensson, A. N. Talbot.

ON ENGINEERING EDUCATION: Desmond FitzGerald, Onward Bates, D. W. Mead.

ON STEEL COLUMNS AND STRUTS: Austin L. Bowman, James H. Edwards, Charles F. Loweth, Rudolph P. Miller, Ralph Modjeski, Frank C. Osborn, George H. Pegram, Lewis D. Rights, George F. Swain, Emil Swensson, Joseph R. Worcester.

ON MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard, George W. Tillson, Nelson P. Lewis, Charles J. Tilden.

ON VALUATION OF PUBLIC UTILITIES: Frederic P. Stearns, Charles S. Churchill, Leonard Metcalf, William G. Raymond, Henry E. Riggs, Jonathan P. Snow, William J. Wilgus.

TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Nelson P. Lewis, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. BenseL.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edward C. Shankland, Edwin Duryea, Jr., James C. Meem, Walter J. Douglas, Samuel T. Wagner, Frank M. Kerr.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. BenseL, T. G. Dabney, C. E. Grunsky, Frank M. Kerr, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellev.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, William McNab, G. J. Ray, Albert F. Reichmann, F. E. Turneure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....5913 Columbus.
CABLE ADDRESS....."Ceas, New York."

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed
in its publications.

SOCIETY AFFAIRS

CONTENTS

	PAGE
Minutes of Meetings:	
Of the Annual Meeting, January 20th and 21st, 1915.....	63
Special Meetings for the Discussion of the Progress Report of the Special Committee on Materials for Road Construction, January 22d, 1915.....	67
Of the Society, February 3d, 1915.....	68
Of the Board of Direction, January 20th, 1915.....	69
Report in Full of the Sixty-second Annual Meeting, January 20th and 21st, 1915...	71
Excursions and Entertainments at the Sixty-second Annual Meeting.....	92
Announcements:	
Hours during which the Society House is open.....	105
Future Meetings.....	105
Annual Convention.....	105
Engineering Foundation.....	105
Searches in the Library.....	106
Papers and Discussions.....	106
Local Associations of Members of the American Society of Civil Engineers.....	107
Minutes of Meetings of Special Committees.....	112
Privileges of Engineering Societies Extended to Members.....	114
Accessions to the Library:	
Donations.....	117
By purchase.....	119
Membership (Additions, Reinstatements, Resignations, Deaths).....	121
Recent Engineering Articles of Interest.....	125

MINUTES OF MEETINGS

OF THE SOCIETY

SIXTY-SECOND ANNUAL MEETING*

January 20th, 1915.—The meeting was called to order at 10 A. M.; President Hunter McDonald in the chair; Charles Warren Hunt, Secretary; and present, also, about 600 members.

The Secretary presented the report of the Tellers appointed previously by the Board of Direction to canvass the Ballot for Officers for the ensuing year.

The President announced the election of the following officers:

President, to serve one year:

CHARLES D. MARX, Stanford University, Cal

Vice-Presidents, to serve two years:

DANIEL BONTECOU, Kansas City, Mo.

CLEMENS HERSCHEL, New York City

* A full report of the Sixty-second Annual Meeting is printed on pages 71 to 91 of this number of *Proceedings*.

Treasurer, to serve one year:

LINCOLN BUSH, New York City

Directors, to serve three years:

JOHN V. DAVIES, New York City
 GEORGE A. HARWOOD, New York City
 J. E. GREINER, Baltimore, Md.
 JOHN F. COLEMAN, New Orleans, La.
 JOHN B. HAWLEY, Fort Worth, Tex.
 HERBERT S. CROCKER, Denver, Colo.

The Annual Report of the Board of Direction, and the Annual Reports of the Secretary and of the Treasurer,* for the year ending December 31st, 1914, were presented and accepted.

The Secretary read the report of the Committee appointed by the Board of Direction to recommend the award of prizes,† and announced that the Medals and Prizes for the year ending July, 1914, had been awarded by the Board of Direction in conformity with that report, as follows:

THE NORMAN MEDAL to Paper No. 1260, entitled "Hydrology of the Panama Canal", by Caleb Mills Saville, M. Am. Soc. C. E.

THE J. JAMES R. CROES MEDAL to Paper No. 1254, entitled "Tufa Cement, as Manufactured and Used on the Los Angeles Aqueduct", by J. B. Lippincott, M. Am. Soc. C. E.

THE THOMAS FITCH ROWLAND PRIZE to Paper No. 1270, entitled "Irrigation and River Control in the Colorado River Delta", by H. T. Cory, M. Am. Soc. C. E.

THE JAMES LAURIE PRIZE to Paper No. 1275, entitled "The Elevation of the Tracks of the Philadelphia Germantown and Norristown Railroad, Philadelphia, Pa.", by Samuel Tobias Wagner, M. Am. Soc. C. E.

THE COLLINGWOOD PRIZE FOR JUNIORS to Paper No. 1264, entitled "Experiments on Weir Discharge", by W. G. Steward, Esq., and J. S. Longwell,‡ Jun. Am. Soc. C. E.

The Secretary presented the report of the Tellers appointed by the Board of Direction to canvass the suggestions as to members of the Nominating Committee, and the following were appointed to serve two years:

CHARLES HANSEL.....	Representing District No. 1
JAMES W. ROLLINS, JR.....	" " " 2
J. A. O'CONNOR.....	" " " 3

* For these reports, see pages 21 to 30 of *Proceedings* for January, 1915 (Vol. XLI).

† See page 73.

‡ The Collingwood Prize for Juniors was awarded to Mr. Longwell for his participation in the preparation of this paper, Mr. Steward not being connected with the Society.

W. C. CUSHING.....	Representing District No. 4			
ALEXANDER MAITLAND, JR....	"	"	"	5
P. H. NORCROSS.....	"	"	"	6
CHARLES DERLETH, JR.....	"	"	"	7

The consideration of the following proposed amendment to the Constitution was then taken up:

Amend Article VII—Nomination and Election of Officers—as follows:

Strike out Section 1, and substitute the following:

"The Board of Direction shall, from time to time, divide the territory occupied by the membership into thirteen geographical districts, to be designated by numbers. District No. 1 shall be the territory within fifty miles of the Post Office in the City of New York. Each of the other districts shall be, as nearly as practicable, contiguous territory, and shall be designated as Districts Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. The Board shall announce such division to the Society on or before the first day of March in each year."

Strike out the first paragraph of Section 2, and substitute the following:

"At the Annual Meeting of each year, seven Corporate Members, not officers of the Society, shall be appointed by the meeting to serve for two years. They shall be selected so as to provide, with the seven members holding over, two members from District No. 1, and one from each of the remaining twelve Districts; and these, with the five living last Past-Presidents of the Society, shall be a committee to nominate officers for the Society."

Strike out the word "and" in the fifteenth line of the third paragraph of Section 2, and after the figure "7" add: "8, 9, 10, 11, 12, and 13."

On motion, duly seconded, the amendment was amended by changing parts of the fifth and sixth lines of the paragraph relating to Section 2 to read as follows: "and these, with the last five living Past-Presidents of the Society, shall be", etc.

W. W. Crosby, M. Am. Soc. C. E., Chairman of the Special Committee on Materials for Road Construction and Standards for Their Test and Use, presented a Progress Report of that Committee.*

The Committee was continued.

A. L. Bowman, M. Am. Soc. C. E., Chairman of the Special Committee on Steel Columns and Struts, presented a Progress Report of that Committee.†

On motion, duly seconded, it was ordered that the report be printed in *Transactions*.

* Printed on pages 2997 to 3050 of Papers and Discussions in the *Proceedings* for December, 1914.

† Printed on pages 3051 to 3062 of Papers and Discussions in the *Proceedings* for December, 1914.

Nelson P. Lewis, M. Am. Soc. C. E., Chairman of the Special Committee to Investigate the Conditions of Employment of, and Compensation of, Civil Engineers, presented a Progress Report of that Committee.*

On motion, duly seconded, the Committee was continued.

Richard L. Humphrey, M. Am. Soc. C. E., Secretary of the Special Committee on Concrete and Reinforced Concrete, stated that the Committee had nothing to report at this time.

This was accepted as a Progress Report.

Frederic P. Stearns, Past-President, Am. Soc. C. E., Chairman of the Special Committee on Valuation of Public Utilities, presented a Progress Report of that Committee.†

The report was accepted and the Committee continued.

Robert A. Cummings, M. Am. Soc. C. E., Chairman of the Special Committee to Codify Present Practice on the Bearing Value of Soils for Foundations, presented a Progress Report of that Committee.‡

On motion, duly seconded, the report was accepted and the Committee continued.

The Secretary read a communication from Desmond FitzGerald, Past-President, Am. Soc. C. E., Chairman of the Special Committee on Engineering Education.

The Committee was continued.

F. H. Newell, M. Am. Soc. C. E., Chairman of the Special Committee on A National Water Law, reported progress.

The Committee was continued.

C. McD. Townsend, M. Am. Soc. C. E., Chairman of the Special Committee on Floods and Flood Prevention, reported progress.

The Committee was continued.

A. N. Talbot, M. Am. Soc. C. E., Chairman of the Special Committee to Report on Stresses in Railroad Track, presented a Progress Report of that Committee.§

The Committee was continued.

The Secretary read the Rules adopted by the Board of Direction for the Appointment, Government, and Procedure of Special Committees, January 6th, 1915.||

The Secretary announced the establishment of a fund, termed the Engineering Foundation, which is to be "devoted to the advancement of the Engineering Arts and Sciences in all their branches, to the greatest good of the Engineering Profession, and to the benefit of Mankind." This fund is to be administered by a board in which the American Society of Civil Engineers, the American Institute of Mining Engi-

* Printed on pages 3063 to 3071 of Papers and Discussions in the *Proceedings* for December, 1914.

† See p. 82.

‡ See p. 491 of Papers and Discussions in this number.

§ See p. 85.

|| Printed on pages 7 to 9 of *Proceedings*, for January, 1915.

neers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers are to be equally represented. The inaugural meeting is to be held at 8.30 P. M. on Wednesday, January 27th, 1915, in the Auditorium of the Engineering Societies Building, 29 West 39th Street, New York City.

The Secretary announced that the next Annual Convention of the Society would be held in San Francisco, Cal., on September 16th to 18th, 1915, these days immediately preceding the opening of the International Engineering Congress, on September 20th, 1915.

John A. Ockerson, Past-President, Am. Soc. C. E., offered the following resolution:

"Whereas: Many distinguished members of the American Society of Civil Engineers, including six Past-Presidents, have been prominently identified officially with the several Canal Commissions and are largely responsible for the location, development of plans, and inauguration of construction work, all of which have resulted in a successful Isthmian Canal, and

"Whereas: The Chief Engineer of the Canal and Governor of the Canal Zone and his chief associates, whose energy and ability have carried to a successful completion the greatest of all engineering works, are also members of this Society, therefore, be it

"Resolved: That this Society should be formally represented at the opening ceremonies of the Panama Canal by a suitable delegation of its members, and that official sanction and recognition for such participation be requested from the proper authorities in charge thereof; and be it further

"Resolved: That the Board of Direction be and is hereby requested to take such steps as may be found necessary to carry these resolutions into effect."

On motion, duly seconded, the resolution was passed.

Charles D. Marx, President-elect, Am. Soc. C. E., addressed the meeting on the subject of the International Engineering Congress.

Mr. Charles C. Schneider and Mr. Charles Macdonald conducted Mr. Marx to the chair.

Mr. Marx addressed the meeting briefly.

Adjourned.

SPECIAL MEETINGS FOR THE DISCUSSION OF THE PROGRESS REPORT OF THE SPECIAL COMMITTEE ON MATERIALS FOR ROAD CONSTRUCTION

January 22d, 1915.—The meeting was called to order at 10.15 A. M.; President Charles D. Marx in the chair; Charles Warren Hunt, Secretary; and present, also, 175 members and guests.

The President announced that the special meetings were called to afford an opportunity for members of the Society and non-members to discuss the 1915 Report of the Special Committee on "Materials for Road Construction and Standards for Their Test and Use". The President then requested W. W. Crosby, M. Am. Soc. C. E., to serve

as Chairman of the meetings and A. H. Blanchard, M. Am. Soc. C. E., to serve as Secretary.

Written discussions submitted by Messrs. C. S. Reeve, John S. Miller, Jr., and Clifford Richardson were read by the Secretary. The Report was then discussed by Messrs. James Owen, E. W. Stern, T. Hugh Boorman, W. H. Fulweiler, J. E. Myers, W. H. Kershaw, Philip P. Sharples, R. A. Meeker, W. M. Kinney, Hunter McDonald, Theron M. Ripley, Edwin H. Thomes, and Robert A. MacGregor.

Adjourned.

January 22d, 1915.—The meeting was called to order at 2.15 p. m.; W. W. Crosby in the chair; A. H. Blanchard, acting as Secretary; and present, also, 145 members and guests.

The discussion of the 1915 Report of the Special Committee on Materials for Road Construction was continued by Messrs. Theron M. Ripley, Bertrand H. Wait, E. M. Vail, Edwin H. Thomes, W. B. Spencer, T. Hugh Boorman, George P. Hemstreet, R. A. Meeker, P. A. Dallis, Philip P. Sharples, L. L. Tribus, Leonard C. Jordan, H. W. Durham, Robert A. MacGregor, W. T. Hedley, William H. Connell, and C. R. Allen, Jr.

Adjourned.

REGULAR MEETING

February 3d, 1915.—The meeting was called to order at 8.30 p. m.; James Owen, M. Am. Soc. C. E., in the chair; Charles Warren Hunt, Secretary; and present, also, 90 members and 17 guests.

The minutes of the meetings of December 16th, 1914, and January 6th, 1915, were approved as printed in *Proceedings* for January, 1915.

A paper by R. C. Strachan, M. Am. Soc. C. E., entitled "Nomographic Solutions for Formulas of Various Types", was presented by the author and illustrated with lantern slides. The paper was discussed by Messrs. J. O. Eckersley and R. H. Merrill, and communications on the subject from Messrs. Allen Hazen and Carl B. Andrews were read by the Secretary. Other communications on the subject, from Messrs. Charles W. Schubert and Paul C. Nugent, on account of their mathematical nature, were read by title only.

A paper by William W. Harts, M. Am. Soc. C. E., entitled "Rivers and Railroads in the United States", was presented by the Secretary who also read a communication on the subject from Walter S. Wheeler, M. Am. Soc. C. E.

The paper was discussed by F. Lavis, M. Am. Soc. C. E.

The Secretary announced the following deaths:

JOHN WYKEHAM JACOMB-HOOD, of London, England, elected Member February 5th, 1902; died in March, 1914.

CHARLES EZEKIEL RASINSKY, of Cincinnati, Ohio, elected Associate Member July 9th, 1912; died December 26th, 1914.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

January 20th, 1915.—The Board met during the Annual Meeting, as required by the Constitution, at the House of the Society, January 20th, 1915, at 2.10 P. M., President Marx in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bensel, Bontecou, Bush, Coleman, Connor, Crocker, Davies, Edwards, Endicott, Fuller, Greiner, Harwood, Haskell, Hawley, Herschel, Hodge, Keefer, Leonard, Loweth, McDonald, Metcalf, Montfort, Ockerson, Swain, Tuttle, and Williams.

The following Standing Committees were appointed:

Finance Committee: Henry W. Hodge, George W. Fuller, Clemens Herschel, Leonard Metcalf, and John F. Coleman.

Publication Committee: James H. Edwards, J. E. Greiner, Arthur S. Tuttle, Henry R. Leonard, and Gardner S. Williams.

Library Committee: George A. Harwood, J. V. Davies, H. S. Crocker, M. E. Cooley, and Chas. Warren Hunt.

The President announced that the first business was the election of a Secretary.

Mr. Hunt retired.

Chas. Warren Hunt was nominated and the nomination was seconded.

Past-President Mordecai T. Endicott was nominated and the nomination was seconded.

Mr. Endicott retired.

A ballot was taken, which resulted in the election of Mr. Hunt.

Mr. Endicott was recalled.

Mr. Hunt was recalled, and the President announced to him his election.

It was decided that the next meeting of the Board be held on Tuesday, March 2d, 1915, and that subsequent regular meetings of the Board be held bi-monthly on the Tuesday before the first Wednesday in May, July, September, November, and January.

The resolution offered by Past-President Ockerson at the Annual Meeting relating to the representation of this Society at the opening ceremonies of the Panama Canal, which was referred to the Board of Direction by the Annual Meeting for action, was considered, and the President was authorized to appoint a Committee of three, of which he shall be Chairman, with power to carry out the purport of the above resolution.

The President subsequently appointed to act with him on this Committee Messrs. Endicott and Ockerson.

The following resolution was adopted:

"Resolved: That, in the opinion of the Board of Direction of the American Society of Civil Engineers, it would be unfortunate for

the present Alaskan Railway Commission to be superseded, and that the interest of the Public demands that the present Commission be allowed to carry out the construction as well as the location of the line."

The President was requested to write to the President of the United States calling his attention to this resolution.

Adjourned.

REPORT IN FULL OF THE SIXTY-SECOND ANNUAL MEETING, JANUARY 20TH AND 21ST, 1915

Wednesday, January 20th, 1915 (10 A. M.)—Hunter McDonald, President, in the chair; Charles Warren Hunt, Secretary; and present, also, about 600 members.

THE PRESIDENT.—Gentlemen, please come to order.

Meeting called
to order.

Our first business will be the report of the Tellers on the ballot for officers. The Secretary will please read the report of the Tellers.

THE SECRETARY.—The Tellers appointed to canvass the ballot for officers of the Society report as follows:

Report of
Tellers on
Ballot
for Officers.

"220 West 57th Street,
New York, N. Y.

"JANUARY 20TH, 1915.

"TO THE SIXTY-SECOND ANNUAL MEETING

"AMERICAN SOCIETY OF CIVIL ENGINEERS:

"The Tellers appointed to canvass the ballots for Officers of the Society for 1915 report as follows:

"Total number of ballots received.....	3 387
Ballots without signatures.....	13
" with illegible signatures.....	0
" stamped, not signed.....	4
" from members in arrears of dues.....	18
Total number not entitled to vote.....	35
Ballots canvassed	3 352
Defective	48

"For President:

CHARLES D. MARX.....	3 274
Scattering	11

"For Vice-Presidents:

DANIEL BONTECOU	3 240
CLEMENS HERSCHEL	3 241
Scattering	17

"For Treasurer:

LINCOLN BUSH	3 278
Scattering	3

"For Directors:

"District No. 1. {	JOHN V. DAVIES	3 013
	FREDERIC MOLITOR	1 188
	GEORGE A. HARWOOD	2 192
	Scattering	15

Report of
Tellers
(continued).

"District No. 4. }	J. E. GREINER	3 241
	Scattering	9
"District No. 6. }	JOHN F. COLEMAN	3 217
	JOHN B. HAWLEY	3 220
	Scattering	27
"District No. 7. }	HERBERT S. CROCKER	3 240
	Scattering	9

"JOHN G. VAN HORNE,
"OTIS E. HOVEY,
"WILLIAM J. BOUCHER,
"WESTON E. FULLER,
"F. LAVIS,
"HOWARD B. BAIRD,
"D. L. TURNER,
"J. H. GRANBERY,
"FREDERICK C. NOBLE,
"ALBERT A. NORTHROP,
"Tellers."

Officers
Declared
Elected.

THE PRESIDENT.—I now declare the following Officers elected as the result of this ballot: Mr. Charles D. Marx, President; Messrs. Daniel Bontecou and Clemens Herschel, Vice-Presidents; Mr. Lincoln Bush, Treasurer; Messrs. John V. Davies and George A. Harwood, Directors from District No. 1; Mr. J. E. Greiner, Director from District No. 4; Messrs. John F. Coleman and John B. Hawley, Directors from District No. 6; and Mr. Herbert S. Crocker, Director from District No. 7.

Report of the
Board of
Direction.

Our next business will be the Annual Report of the Board of Direction, which the Secretary will please read.

The Secretary presented the Report of the Board of Direction.*

THE PRESIDENT.—We will now hear the Report of the Secretary.

Report of the
Secretary.

The Secretary presented his Report† of receipts and disbursements for the year.

THE PRESIDENT.—We will hear the Report of the Treasurer, if Mr. Wallace is here; if not, we will ask the Secretary to read it.

Report of the
Treasurer.

The Secretary read the Report of the Treasurer.‡

THE PRESIDENT.—These Reports are before you, gentlemen. Unless some member wishes to discuss them we will consider them adopted. The Chair hears no discussion.

The next business is the award of medals and prizes for 1914.

Award of
Medals and
Prizes.

THE SECRETARY.—Mr. President, I will read the Report of the Committee appointed to recommend the award of prizes, dated December 29th, addressed to the Board of Direction.

* See *Proceedings*, Am. Soc. C. E., Vol. XLI, p. 21 (January, 1915).

† See *Proceedings*, Am. Soc. C. E., Vol. XLI, p. 28 (January, 1915).

‡ See *Proceedings*, Am. Soc. C. E., Vol. XLI, p. 30 (January, 1915).

*"Board of Direction,
American Society of Civil Engineers,
220 West 57th Street,
Borough of Manhattan, N. Y. City.*

"DEC. 29TH, 1914.

"GENTLEMEN:—Your Committee, which was appointed to recommend the award of prizes for the year 1914 for papers submitted to and accepted by the Society, has carefully read and considered the merits of all the papers which were published and which are eligible under the established rules for competition for any one of the five prizes awarded at this time.

"In making the following recommendations we do not wish to imply that in our opinions no other papers are of sufficient merit to deserve such recognition. On the contrary, there are a number of very meritorious papers between which and those selected there are no great differences so far as merit is concerned and whose authors deserve commendation for the thorough and interesting manner in which they have treated their subjects. We also consider it a matter for regret that the excellent paper presented by Mr. W. E. Lilly, upon 'The Strength of Columns' is not eligible for this competition because its author is not a member of the Society.

"It is quite possible that others may not concur in our conclusions or that your Board may not approve of the recommendations but our decision has been reached after careful study and discussion and it is unanimous.

"We, therefore, respectfully recommend,

- "1. That the Norman Medal be awarded to Mr. Caleb Mills Saville, for his paper upon the 'Hydrology of the Panama Canal';
- "2. That the J. J. R. Croes Medal be awarded to Mr. J. B. Lippincott, for his paper upon 'Tufa Cement, as Manufactured and Used on the Los Angeles Aqueduct';
- "3. That the Thomas Fitch Rowland Prize be awarded to Mr. H. T. Cory, for his paper upon 'Irrigation and River Control in the Colorado River Delta';
- "4. That the James Laurie Prize be awarded to Mr. Samuel Tobias Wagner, for his paper upon 'The Elevation of the Tracks of the Philadelphia, Germantown and Norristown Railroad, Philadelphia, Pa.';
- "5. That the Collingwood Prize for Juniors be awarded to Mr. J. S. Longwell for his participation in the preparation of the paper upon 'Experiments on Weir Discharge'.

"Mr. W. G. Steward who collaborated with Mr. Longwell in the preparation of this paper is not a member of the Society in any grade and, therefore, cannot participate in the award.

"Respectfully submitted,

"E. J. FORT,

"E. G. HOPSON,

"H. D. WILLIAR,

"Committee."

Mr. President, I have to report that the Board of Direction, on receipt of this report, unanimously awarded the prizes in accordance with the recommendations made.

THE PRESIDENT.—No further action is necessary on that report. The next business is the report on members to serve on the Nominating Committee for the next two years. The Secretary will read the result of the ballot on Members of the Nominating Committee.

Appointment
of
Nominating
Committee.

THE SECRETARY.—The following is the Report of the Tellers appointed by the Board of Direction to canvass the suggestions for members of the Nominating Committee to be appointed by the Annual Meeting:

“District No. 1: Total suggestions received, 415, as follows:

Charles Hansel.....	208
C. W. Bryan.....	148
D. L. Turner.....	51
Scattering	8”

Mr. President, will you take up each section as it is read?

THE PRESIDENT.—We will take up one section at a time. The question of the appointment of the member of the Nominating Committee for District No. 1 is before you.

A. L. BOWMAN, M. AM. SOC. C. E.—I move that Mr. Hansel, having received the largest number of votes, be appointed a member of the Nominating Committee for District No. 1.

Motion seconded.

THE PRESIDENT.—It is moved and seconded that Mr. Charles Hansel be appointed a member of the Nominating Committee for District No. 1. All in favor of the motion will say “aye”; all opposed, “no”. The motion is carried.

THE SECRETARY.—“District No. 2: Total suggestions received, 154, as follows:

James W. Rollins, Jr.....	117
William H. Moore.....	27
G. E. Verrill.....	3
Scattering	7”

J. WALDO SMITH, M. AM. SOC. C. E.—I move that Mr. Rollins be appointed a member of the Nominating Committee for District No. 2.

Motion seconded.

THE PRESIDENT.—It is moved and seconded that Mr. James W. Rollins, Jr., be appointed a member of the Nominating Committee for District No. 2. All in favor of the motion say “aye”; contrary, “no”. Carried.

THE SECRETARY.—“District No. 3: Total suggestions received, 224, as follows:

J. A. O'Connor.....	176
E. A. Fisher.....	31
Walter McCulloh.....	8
Scattering	9”

THE PRESIDENT.—What shall we do with the report for District No. 3?

MR. J. WALDO SMITH.—I move that Mr. O'Connor be appointed a member of the Nominating Committee for District No. 3, he having received the largest number of votes.

THE PRESIDENT.—It is moved and seconded that Mr. J. A. O'Connor be appointed a member for District No. 3. All in favor of the motion say “aye”; all opposed, “no”. Carried.

THE SECRETARY.—“District No. 4: Total suggestions received, 212, as follows:

W. C. Cushing.....	123
A. J. Himes.....	48
H. H. Quimby.....	34
Scattering	7”

ROBERT A. CUMMINGS, M. AM. SOC. C. E.—I move that Mr. Cushing be appointed as the representative on the Nominating Committee for District No. 4.

THE PRESIDENT.—It is moved and seconded that Mr. W. C. Cushing be appointed a member of the Nominating Committee for District No. 4; all in favor of the motion will say “aye”; all opposed “no”. The motion is carried.

THE SECRETARY.—“District No. 5: Total suggestions received, 181, as follows:

Alexander Maitland.....	99
T. L. Condron.....	41
J. W. Alvord.....	22
Scattering	19”

J. A. OCKERSON, PAST-PRESIDENT, AM. SOC. C. E.—Mr. President, I move that Mr. Alexander Maitland be appointed as the representative of the Nominating Committee from District No. 5.

Motion seconded.

THE PRESIDENT.—It is moved and seconded that Mr. Alexander Maitland be appointed a member of the Nominating Committee for District No. 5. All in favor of that motion will say “aye”; all opposed, “no”. The motion is carried.

Nominating
Committee
(continued).

THE SECRETARY.—“District No. 6: Total suggestions received, 142, as follows:

P. H. Norcross.....	73
J. E. Crawford.....	31
B. M. Hall.....	18
Scattering	20”

A MEMBER.—I move that Mr. Norcross be appointed a member of the Nominating Committee from the Sixth District.

Motion seconded.

THE PRESIDENT.—It is moved and seconded that Mr. P. H. Norcross be appointed a member of the Nominating Committee for District No. 6. All in favor of the motion say “aye”; all opposed, “no”. Mr. Norcross is appointed.

THE SECRETARY.—“District No. 7: Total suggestions received, 224, as follows:

Charles Derleth, Jr.....	110
J. B. Lippincott.....	37
D. C. Henny.....	28
Scattering	49”

ALLEN HAZEN, M. AM. SOC. C. E.—Mr. President, I move that Mr. Charles Derleth, Jr., having received the largest number of suggestions, be appointed a member of the Nominating Committee from the Seventh District.

Motion seconded.

THE PRESIDENT.—It is moved and seconded that Mr. Charles Derleth, Jr., be appointed a member of the Nominating Committee from District No. 7. The motion is carried.

THE SECRETARY.—I have only to say that this report is signed by the tellers: Henry W. Hodge, Arthur S. Tuttle, and J. H. Edwards.

Proposed
Amendment
to the
Constitution.

THE PRESIDENT.—The next business before the meeting is the consideration of the proposed Amendment to the Constitution. The Secretary will please read the Amendment.

THE SECRETARY.—The following proposed Amendment to the Constitution of the American Society of Civil Engineers, having been received by the Secretary prior to the first Wednesday in November, 1914, is herewith presented. It was sent by letter to all Corporate Members of the Society, and is in order for discussion at this meeting in accordance with Article IX, Section 2, of the Constitution.

“Amend Article VII—Nomination and Election of Officers—as follows:

“Strike out Section 1, and substitute the following:

“The Board of Direction shall, from time to time, divide the territory occupied by the membership into thirteen geographical dis-

tricts, to be designated by numbers. District No. 1 shall be the territory within fifty miles of the Post Office in the City of New York. Each of the other districts shall be, as nearly as practicable, contiguous territory, and shall be designated as Districts Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. The Board shall announce such division to the Society on or before the first day of March in each year.

"Strike out the first paragraph of Section 2, and substitute the following:

"At the Annual Meeting of each year, seven Corporate Members, not officers of the Society, shall be appointed by the meeting to serve for two years. They shall be selected so as to provide, with the seven members holding over, two members from District No. 1, and one from each of the remaining twelve Districts; and these, with the five living last Past-Presidents of the Society, shall be a committee to nominate officers for the Society.

"Strike out the word 'and' in the fifteenth line of the third paragraph of Section 2, and after the figure '7' add: '8, 9, 10, 11, 12, and 13'."

This Amendment is signed by the following corporate members: R. Montfort, W. A. Cattell, E. H. Connor, E. E. Haskell, and S. H. Hedges.

THE PRESIDENT.—This proposed Amendment, gentlemen, is now before you for discussion, before it is issued to letter-ballot.

R. MONTFORT, M. AM. SOC. C. E.—Mr. President, I move that it be sent to letter-ballot, without further amendment.

GARDNER S. WILLIAMS, M. AM. SOC. C. E.—There is one change in the language of that Amendment that I think would have to be made, as it is not proper English at present. I think it says "the five living last Past-Presidents." I beg to say that there is but one last Past-President, whether he is dead or any other way. I will offer an amendment to that to strike out the words "five" and "last", and let it stand with the "living Past-Presidents". I see no good reason why the Past-President representation on this Committee should be limited to five. I think it will be better for the Society if all living Past-Presidents are permitted to participate in the work of the Nominating Committee. They are able to take a better perspective view of the needs of the Society than any other men in it, and I think the Society should have the advantage of their knowledge, experience, and judgment in picking out those who are to help them as their officers thereafter.

I have not discussed this subject with anybody so far, and I do not know whether there is any one in the room who wishes to support this motion, but I make it in the hope that some one will hold the same view that I do.

A MEMBER.—I would like to second that motion.

Discussion
on
Proposed
amendment
to the
constitution.

THE PRESIDENT.—The motion is before you, gentlemen, for discussion.

A. D. FLINN, M. AM. SOC. C. E.—Mr. President, I would like to inquire whether Mr. Williams will accept the additional words, "Past-Presidents who continue to be members of the Society". I suppose it is improbable that any will drop out, but—

THE PRESIDENT.—Mr. Williams accepts that amendment to his proposed amendment. Gentlemen, Mr. Williams' amendment is before you for discussion. I think the first thing to do is to pass upon the suggestion that the language of the amendment be corrected, and I would ask Mr. Williams to state with precision exactly how he intended it to read.

MR. WILLIAMS.—If this amendment is carried, of course it eliminates that phase of the subject. If this amendment is voted down, then I will make a specific amendment to cover that.

THE PRESIDENT.—We will then consider first the motion to include all the living Past-Presidents as members of the Nominating Committee, and the question is before this meeting for discussion. I would be glad to hear from any members who wish to discuss it.

A. W. CARPENTER, M. AM. SOC. C. E.—I would like to ask how many Past-Presidents there are living?

THE PRESIDENT.—The Secretary reports eight.

THE SECRETARY.—Eight in addition to the five.

J. G. VAN HORNE, M. AM. SOC. C. E.—Would mileage have to be paid to the thirteen men?

THE SECRETARY.—Mr. President, I do not wish to be considered in opposition to any motion at all. I merely wish to call attention to the fact that it is a dangerous matter to adopt, off-hand, an amendment to the Constitution of the Society. We frequently find that one part of the Constitution does not quite agree with the others; and there should be a careful study made before any amendment is adopted. I find one clause here which may or may not have some bearing on this matter: "At all meetings of the committee [referring to the Nominating Committee] eight members shall constitute a quorum". I remember very well when the discussion on that matter took place in the Society at Seattle, and it was based very largely on the number of members of the Committee who were not Past-Presidents, there being seven districts and fourteen members appointed from those districts; and eight is a majority of those fourteen. I merely make that as a suggestion which should receive consideration.

THE PRESIDENT.—The Chair would call attention to the fact that this is a very radical change in our past practice, and the amendment should not be made unless it is thoroughly discussed.

GEORGE M. PURVER, ASSOC. M. AM. SOC. C. E.—I want to say, in reference to this amendment proposed, that we have before us now an

increase of districts, which makes from those districts fourteen members, and with the five Past-Presidents, gives us nineteen. I have no objection to all the Past-Presidents taking part in the nomination of the officers of the Society, but it is going to be unwieldy; I am afraid we are going to get too many members on the Nominating Committee, so that we will not get as good service as with a smaller number.

F. P. STEARNS, PAST-PRESIDENT, AM. SOC. C. E.—As one of the Past-Presidents, I wish to say a word. It seems to me that five Past-Presidents furnish a balance wheel, and then again, on personal grounds, I think that after a President has served for five years, in that capacity, after going out of office, he is entitled to a rest.

THE PRESIDENT.—Is there any further discussion on Mr. Williams' motion? Are you ready for the question? All in favor of the adoption of Mr. Williams' amendment to the Constitutional amendment will say "aye"; all opposed, "no". The amendment is lost.

Mr. Williams now has another amendment, and if he will permit the Chair the suggestion, I think the verbiage can be made correct by striking out the word "last" and placing the word "latest" in front of the word "living", leaving it the "five latest living Past-Presidents". We will ask Mr. Williams then to fix that in the way it ought to be.

THE SECRETARY.—Just a transposition of the word "last" from in front of "Past-Presidents" before the word "five", so that it will read "with the last five living Past-Presidents".

MR. WILLIAMS.—That is correct. I will so move.

Motion seconded.

THE PRESIDENT.—Is there any discussion? If not, all in favor of the motion will say "aye"; all opposed, "no". The motion is carried.

The question is now on the motion of Mr. Montfort to send the proposed amendment out to letter-ballot. Any discussion on the motion?

MR. HAZEN.—Mr. President, I believe most thoroughly in the division of the districts as proposed. From experience on the committee that struggled with this matter last year, I also appreciate the force of what the Secretary has said, and it will be embarrassing to adopt any amendment that might be in conflict with any other part of the Constitution; and, without delaying the matter, is it not possible to refer it to a committee to make sure that it is in proper form; or can we not get some assurance that it is in proper form as it stands, before letting it go forward?

THE PRESIDENT.—I will ask the Secretary to reply to Mr. Hazen's inquiry.

THE SECRETARY.—Mr. President, this Amendment to the Constitution was gotten up by a committee of the Board of Direction after studying the matter for several months; two years ago it came up

Proposed
Amendment
to the
Constitution
(continued).

at the Annual Convention at Ottawa and was amended, and on the ballot was defeated, because it had some other matter added to it.

The Board of Direction then took the matter up, appointed another Committee, and that Committee studied it over most carefully in relation to all the parts of the Constitution, and reported it in the same words as the previous Committee had done; so I think really this amendment has received very careful consideration, as it is now, with reference to other parts of the Constitution.

MR. HAZEN.—On the Secretary's assurance that this amendment is in proper form, I move that the amendment be submitted to the membership for vote.

Motion seconded.

THE PRESIDENT.—Is there any further discussion on the motion? If not, all in favor will say "aye"; all opposed, "no". The motion is carried. The amendment will be sent out to letter-ballot.

Report of
Committee on
Materials for
Road
Construction.

We will now hear the Report of the Special Committee on Materials for Road Construction and on Standards for Their Test and Use, by Mr. W. W. Crosby, Chairman.

W. W. CROSBY, M. AM. SOC. C. E.—Mr. President, the report is long, and has been printed. In its printed form it is much more intelligible than it would be on being read, and to save the time of the meeting, I would like to suggest that the report be received and read by title only at this time.

THE PRESIDENT.—The suggestion of the Chairman is before you. Has Mr. Crosby's motion a second?

Motion duly seconded.

THE PRESIDENT.—It is moved and seconded that the Progress Report of the Committee be received. All in favor of the motion will say "aye"; all opposed, "no".

The motion is carried.

MR. CROSBY.—Mr. President, may I make an announcement? Gentlemen, the printed report of this Committee is available, and, through the courtesy of the Board of Direction, Special Meetings of the Society have been arranged for Friday, of this week, at 10 A. M. and 2 P. M., at which time discussion of this report is invited. The Committee hopes that there will be a good attendance at those meetings, and that constructive criticism of the report will be presented to the fullest possible extent. The Committee would like the assistance which may be secured in that way.

Report of
Committee on
Steel Columns
and Struts.

THE PRESIDENT.—We will hear the Progress Report of the Special Committee on Steel Columns and Struts, Mr. A. L. Bowman, Chairman.

A. L. BOWMAN, M. AM. SOC. C. E.—Mr. President and Gentlemen of the Society, the Progress Report of your Committee has been

printed* in *Proceedings*. The tests mentioned therein are being continued.

At the meeting of the Board of Direction on June 2d, 1914, Mr. Rudolph P. Miller was appointed to fill the place of the late Emil Gerber; and I would like to say that the Committee appreciated Mr. Gerber highly, both the personality of the man and the work he did for the Committee.

I move that this Progress Report be printed in the *Transactions* of the Society, in order that this record of tests be preserved to our members.

Motion seconded.

THE PRESIDENT.—It is moved and seconded that this Progress Report be printed in the *Transactions* of the Society. All in favor of the motion say "aye"; all opposed, "no". Carried.

W. W. CREHORE, M. AM. SOC. C. E.—(Mr. Crehore made a brief discussion, which will be found among the Papers and Discussions of this number of *Proceedings*.)

L. D. RIGHTS, M. AM. SOC. C. E.—(Mr. Rights, Secretary of the Committee, replied briefly to Mr. Crehore.)

ALEXANDER HARING, M. AM. SOC. C. E.—Mr. President, I move that this Progress Report be printed in the *Transactions* of the Society, so that this record of tests may be preserved for the use of the members.

Motion seconded.

THE PRESIDENT.—Gentlemen, you have heard the motion. All in favor say "aye"; all opposed, "no". The motion is carried.

The next report is that of the Special Committee to Investigate the Conditions of Employment of, and Compensation of, Civil Engineers, Mr. Nelson P. Lewis, Chairman.

NELSON P. LEWIS, M. AM. SOC. C. E.—Mr. President and Gentlemen, the report has been printed in the *Proceedings* of the Society.† Is it your pleasure that I read it, Mr. President?

THE PRESIDENT.—No, I think we had better dispense with the reading of it, but we would be glad to hear whatever explanatory remarks you care to make.

(Mr. Lewis made some remarks explanatory of the Report.)

MR. WILLIAMS.—I move that the Committee be continued and instructed to use its discretion as to what steps it shall take to further this investigation.

Motion seconded.

THE PRESIDENT.—The motion is before you, gentlemen. Is there any discussion? All in favor of the motion will say "aye"; all opposed, "no".

Report of
Committee on
Employment
and
Compensation
of Civil
Engineers.

* See *Proceedings*, Am. Soc. C. E., for December, 1914, pages 3051 to 3062 of Papers and Discussions.

† See *Proceedings*, Am. Soc. C. E., for December, 1914, pages 3063 to 3071 of Papers and Discussions.

The motion is carried.

Report of
Committee on
Concrete and
Reinforced
Concrete.

We will now hear from the Special Committee on Concrete and Reinforced Concrete, Mr. Joseph R. Worcester, Chairman.

RICHARD L. HUMPHREY, M. AM. SOC. C. E.—Mr. President, Mr. Worcester, I think, is not here. As the Secretary of the Committee, I would call the attention of the Society to the fact that at the last Annual Meeting a resolution was passed that the Committee would not be expected to report until it had something to report. The Committee has nothing to report at this time.

THE PRESIDENT.—We will accept the Report of the Secretary, Mr. Humphrey, as a Progress Report.

The Special Committee on Engineering Education, Mr. Desmond FitzGerald, Chairman. Is Mr. FitzGerald present? We will pass that for the present. The Secretary has a communication from the Chairman, but he is out of the hall at present. We will take that up later.

Report of
Committee on
Valuation.

The report of the Special Committee on Valuation of Public Utilities, Mr. Frederic P. Stearns.

(Mr. Stearns presented the following statement of the work of his Committee):

"Your Special Committee, appointed to Formulate Principles and Methods for the Valuation of Railroad Property and Other Public Utilities, has no formal report to present at this meeting, but has requested its Chairman to make a brief statement of the progress made during the past year.

"It may be well to recall that a formal progress report of the Committee was presented at the last Annual Meeting of the Society, and that in accordance with a resolution offered by the Chairman at that meeting it was referred back to the Committee for further consideration.

"A special meeting for the discussion of the report was held March 11, 1914, and it was again discussed at an adjourned meeting held on the afternoon and evening of April 2, 1914. Written discussions were received for several months, the last being published in the *Proceedings* for August, 1914.

"In April the Committee suffered a great loss by the death of two of its valued members, Thomas H. Johnson and Alfred Noble, and a further vacancy was created by the resignation of Henry M. Byllesby. These vacancies were filled by the Board of Direction in May, by the appointment of Charles S. Churchill, William J. Wilgus, and Henry E. Riggs.

"The present Committee has held two meetings of three days each, one in October and one in December, with the full membership present at each meeting, and has carried on a voluminous written discussion. It has made an outline of a report, of which some chapters have been drafted, discussed, and tentatively agreed to. The writing of drafts of additional chapters has been assigned to different members of the Committee, and progress has been made on these drafts, but, as already

indicated, the work has not advanced far enough to permit the making of a formal report to the Society at this meeting.

"For the Committee:

"FREDERIC P. STEARNS,
"Chairman."

THE PRESIDENT.—Gentlemen, the report of the Committee is before you. Unless there is objection, it will be accepted as a Progress Report.

The Report of the Special Committee to Codify Present Practice on Bearing Value of Soils for Foundations, Mr. Robert A. Cummings, Chairman.

Report of
Committee on
Soils.

ROBERT A. CUMMINGS, M. AM. SOC. C. E.—Mr. President and Members of the American Society: This report consists of about 40 pages of typewritten matter. It is not my intention to read this to you, as it will appear in the *Proceedings* at a later date.*

(Mr. Cummings stated some of the main features of the Report.)

THE PRESIDENT.—Gentlemen, the report of the Committee is before you. The Chair awaits a motion as to its disposition. I feel quite sure that—

T. C. ATWOOD, M. AM. SOC. C. E.—Mr. President, I move that this Report be accepted, and that the Committee be continued. I think the Society is very much indebted to this Committee for the enthusiastic manner in which it has tackled this difficult and rather unintelligible subject, and should be allowed to go ahead in the same way.

Motion seconded.

THE PRESIDENT.—Gentlemen, you have heard the motion. All in favor say "aye"; all opposed "no".

Motion carried.

We now revert to the Progress Report of the Special Committee on Engineering Education. The Secretary has a communication from the Chairman, which we will ask him to read.

Report of
Committee on
Engineering
Education.

The Secretary read the following letter:

"18th Jan. 1915.

"MY DEAR MR. HUNT.—As it seems highly probable that I may not be able to attend the Annual Meeting, will you say for me in regard to the Com. on 'Engineering Education' that the Carnegie Foundation has taken the matter in hand and is now making a careful investigation. The only action that our Committee can now take is to aid the Foundation in every way in our power.

"Very faithfully yours,

"DESMOND FITZGERALD,
"Chairman."

THE PRESIDENT.—Is there any action the Society desires to take with reference to this communication? If not, we will consider that the Committee has reported progress and will be continued.

* This Report is printed in this number of *Proceedings*.

Report of
committee on
A National
Water Law.

The Special Committee on A National Water Law, Mr. F. H. Newell, Chairman.

F. H. NEWELL, M. AM. SOC. C. E.—Mr. President and Gentlemen, I wish to make a very brief statement of progress of the Special Committee on A National Water Law. This Committee has been so well distributed geographically and is so widely apart in its individual views on the subject, that so far it has not been able to get together physically or mentally on the subject.

Moreover, the subject which has been assigned to it is of such far-reaching importance, going away back into the establishment of the Constitution of the United States, and from there on up into the latest freak of State legislation, that we have begun to appreciate that we have a very large task before us, and yet one which is of very great interest, and, as Chairman of the Committee, I hope that the Society will continue it, and that we will perhaps be constituted in such a way that we can get together and organize the Committee, perhaps, into sections, taking up in detail some of these very important points.

I may state, as showing progress, that although the Committee has not been able to get together, we have had a great deal of correspondence among the members, and we have sent out circulars—or the Secretary of the Society has sent out circulars—to all the membership, the replies from which indicate, as I have stated, very wide interest in the subject and very far-reaching importance, in that the substance of those replies indicates that investments aggregating many millions of dollars are being delayed because of uncertainties which grow out of a lack of adequate State and National water laws, and that the fullest use and enjoyment of our National resources are rendered imperfect through existing conditions which might be remedied through well-conceived legislation.

The suggestion has been made that the Committee may take up at the present time the line of investigation which has been entered upon, and endeavor to agree, first on the principles which would be embodied in any new legislation, if it is possible to elucidate this legislation, and to present them as the consensus of the opinion of the Society. It will then be practicable to endeavor to embody them in various drafts of the law.

Various other engineering and local organizations are interested in the subject, and when agreement can be had in part, at least on the broad principles, it is believed that a conference may be had with other organizations, in order that the subject may be presented from other standpoints, and thus secure wider agreements also on fundamentals.

I will not endeavor to discuss further this broad problem, but request, as stated before, that the Committee be continued in its work.

THE PRESIDENT.—Unless there is a discussion of this report of Mr. Newell, the Committee will be considered as continued.

The Special Committee on Floods and Flood Prevention, Col. C. McD. Townsend, Chairman.

Report of
Committee on
Floods and
Flood
Prevention.

C. McD. TOWNSEND, M. AM. SOC. C. E.—Mr. Chairman and Gentlemen, the Special Committee on Floods and Flood Prevention has held three meetings, or rather, attempted to hold three meetings. The membership—as it is necessary to get a good representation of the country—is scattered from Maine to California, but we have appointed a sub-committee to draft a report, and that committee has formed a rough draft, but has been unable to get a consensus of opinion of the membership of the Committee due to its being scattered over the United States, in time for this meeting, and I shall again have to ask an extension of time for this Committee, and can merely report progress.

THE PRESIDENT.—You have heard the report of the Committee. Unless there is a discussion or objection, the Committee will be considered as continued and its present report as one of progress.

The Report of the Special Committee on Stresses in Railroad Track, Professor A. N. Talbot, Chairman.

Report of
Committee on
Stresses in
Railroad
Track.

A. N. TALBOT, M. AM. SOC. C. E.—Mr. President, and Gentlemen of the Society, the Special Committee to Report on Stresses in Railroad Track presents the following report of progress:

“The Committee was formed by action of the Board of Direction, November 12th, 1913. A similar committee was created by the Board of Direction of the American Railway Engineering Association, November 20th, 1913. By action of these two bodies the two Committees have the authority to co-operate, and this co-operation is being carried on. The Board of Direction of the American Society of Civil Engineers made an assignment of funds for the work of the Committee, March 4th, 1914, and a contribution toward the expenses of the tests was received later by the American Railway Engineering Association from the United States Steel Corporation. Funds having been provided sufficient to make a beginning, the initial meeting of the Committee was held in Chicago, March 18th, 1914, at which there was a general discussion of the field of work of the Committee and of the way in which the work should be undertaken. A Sub-Committee was appointed to report on the methods of organization and scope of work of the Committee. At a meeting of the Committee held at Baltimore, June 3d, 1914, the report of this Sub-Committee was presented, discussed and adopted. Three Sub-Committees were appointed, (a) Executive, (b) Tests, and (c) Ways and Means. The programme of testing was referred to the Sub-Committee on Tests and it was decided that the first work should include the development of instruments and methods for tests on track, and that the preliminary tests on track should include observations of the equilibrium depression curve of the track under static load (the measurements to include rail, ties, ballast, and roadbed); and also measurements of the distri-

Report of
Committee on
Stresses in
Railroad
Track
(continued).

bution of strains in the rail. The general plan of carrying on the work was referred to the Executive Committee. Mr. E. H. Fritch was elected Secretary of the Committee.

"During the summer and fall, plans have been developed and a beginning made. The work has included: (a) a study of the problem, (b) development of instruments and methods of carrying on the tests and trying these out in field and laboratory, and (c) static tests on railroad track with heavy locomotives and with single concentrated load. These tests were made on the track of the Illinois Central Railroad near Champaign, Ill. The Sub-Committee on Tests considered the results of the first of these field tests and adopted a general plan of procedure for the static tests. A test party was organized and a start was made on the field tests, and these tests were carried on until unfavorable weather interfered with the work. The work of computation, making records, and developing apparatus has since been continued. Enough experience has been gained to show that the methods used are practicable. During the winter it is expected that some laboratory tests will be made on ballast and on rail joints. Preliminary arrangements have been made for tests on the Baltimore and Ohio Railroad and on the Delaware, Lackawanna and Western Railroad. It is planned to carry on the test work during the coming season.

"The Engineering Experiments Station of the University of Illinois is co-operating with the Committee on this work, through the use of its laboratories and its staff, especially through the assistance of Professor H. F. Moore, in the development of apparatus and methods of tests. It is expected that this co-operative work will be of great assistance to the Committee.

"The Committee has found, as it expected, that the problem assigned to it is a very complicated one, indefinite in many ways, and containing many variables which must be eliminated or their influence determined. The experimental work will involve much tedious and painstaking work, and it is felt that results of value may be obtained only after prolonged work on the problem. The Committee feels that encouraging progress has been made, and enough has been done to warrant the expectation that on some parts of the problem, at least, information of value will be obtained.

"Respectfully submitted,

"Special Committee to Report on Stresses
in Railroad Track.

"A. N. TALBOT,
"Chairman."

THE PRESIDENT.—Is there any discussion on the report just read by Chairman Talbot? If not, and there is no objection, it will be accepted as a Progress Report.

We have now reached the period at which we will hear announcements from the Secretary, if he has any.

THE SECRETARY.—Of interest to the membership, Mr. President, I think I should read the rules which have been adopted by the Board

Rules for
Government
of Special
Committees.

of Direction for the appointment, government and procedure of Special Committees.*

Mr. President, an invitation has been forwarded to all members of the Society, reading as follows:

Engineering
Foundation.

"The Trustees of
The United Engineering Society
representing
The American Institute of Mining Engineers
The American Society of Mechanical Engineers
The American Institute of Electrical Engineers
and with the co-operation of
The American Society of Civil Engineers
request the honor of your presence
at the Inauguration of
The Engineering Foundation
on the evening of Wednesday the twenty-seventh of January
One thousand nine hundred and fifteen
at eight thirty o'clock
in the Auditorium of the Engineering Societies Building
Twenty-nine West Thirty-ninth Street
New York"

This was sent out before it was possible to make an explanation in type of the nature of this Trust and of the programme of the Inauguration Meeting.

The Engineering Foundation is the name given to a Fund to be "devoted to the advancement of the Engineering Arts and Sciences in all their branches, to the greatest good of the Engineering Profession and to the benefit of Mankind."

The initial gift for the Engineering Foundation is from a noted Engineer whose name will be announced at the Inauguration ceremonies.†

The administration of this Fund will be entrusted to a Board of eleven members elected by the Trustees of the United Engineering Society, of which two members will be elected from each of the four National Societies. The President of the United Engineering Society will, *ex officio*, be a member of the Board, and there will be two members chosen at large.

It is hoped that there will be a large attendance of the Profession at the meeting, at which the speakers will be Mr. Gano Dunn, President of the United Engineering Society and Past-President of the American Institute of Electrical Engineers; Dr. Henry Pritchett, President of the Foundation for the Advancement of Teaching; Dr.

* Printed in *Proceedings* for January, 1915, p. 7.

† Since this announcement was made, the Inaugural Meeting has been held and the donor stated to be Mr. Ambrose Swasey, of Cleveland, Ohio.

Engineering
Foundation
(continued).

Robert W. Hunt, Past-President of the American Institute of Mining Engineers; and Dr. Alexander C. Humphreys, Past-President of the American Society of Mechanical Engineers.

Ladies will be cordially welcomed at the meeting.

Annual
Convention.

Mr. President, the Annual Convention of the Society will be held in San Francisco, Cal., September 16th to 18th, 1915. This covers the Thursday, Friday, and Saturday, immediately preceding the opening of the International Engineering Congress on September 20th, 1915. The date was chosen in order to enable members of the Society to attend both the Annual Convention and the Congress, and also to visit the Panama-Pacific Exposition, with the least possible expenditure of time. Thus it will be possible to make the trip from the East, attend all the meetings, excursions, etc., connected with both these meetings, and return within a period of three weeks.

The St. Francis Hotel in San Francisco has been selected as the headquarters' hotel, and a number of rooms have been reserved, both there and in the Palace Hotel. There are also a number of other hotels in which accommodations will be available at somewhat less cost.

Each of the three other National Societies has determined to hold a meeting at or about the same date, and it is proposed to make arrangements for a special train leaving New York about September 9th, and scheduled to arrive in San Francisco on the 15th. It is intended that the members of all these Societies, as well as such European Engineers as may attend the Congress, shall have the opportunity of going together on this train.

It is expected within a short time to issue to the 27 000 members of these four Societies a circular giving preliminary information as to the proposed special train, hotel rates, etc., which will enable those who desire to make their hotel reservations in ample time.

THE PRESIDENT.—We have now reached the heading of New Business.

MR. OCKERSON.—I have a resolution that I would like to offer:

Resolution
Relating to
Opening
Ceremonies
of the
Panama
Canal.

"Whereas: Many distinguished members of the American Society of Civil Engineers, including six Past-Presidents, have been prominently identified officially with the several Canal Commissions and are largely responsible for the location, development of plans, and inauguration of construction work, all of which have resulted in a successful Isthmian Canal, and

"Whereas: The Chief Engineer of the Canal and Governor of the Canal Zone and his chief associates, whose energy and ability have carried to successful completion the greatest of all engineering works, are also members of this Society, therefore be it

"Resolved: That this Society should be formally represented at the opening ceremonies of the Panama Canal by a suitable delegation of its members, and that official sanction and recognition for such participation be requested from the proper authorities in charge thereof; and be it further

"Resolved: That the Board of Direction be and is hereby requested to take such steps as may be found necessary to carry these resolutions into effect."

Resolution seconded.

THE PRESIDENT.—Gentlemen, you have heard the resolution. The chair will be glad to hear any discussion on it. From the manner in which it was received, I assume that the vote will be unanimous. All in favor of the resolution will say "aye"; all opposed, "no".

It is carried.

I would ask that Professor Marx address the meeting on the subject of the International Engineering Congress, to be held in San Francisco.

CHARLES D. MARX, PRESIDENT-ELECT, AM. SOC. C. E.—Mr. President, and Members of the Society: Members who are organizing the International Engineering Congress have asked me to present in as few words as possible the claims of the International Engineering Congress for your support. Let me state briefly that when it was known that an International Fair was to be held in San Francisco in commemoration of this piece of engineering to which Mr. Ockerson has just referred, the engineers on the Pacific Coast felt that some special recognition of the work of the engineers should be shown.

The Commission in charge of the Fair was approached, and the members were asked whether it was likely that any support could be given to that undertaking. This support was refused. Thereupon, the engineers on the Coast made up their minds that, independent of those in charge of the Fair, they would arrange for an Engineering Congress, international in scope, to celebrate suitably the completion of this engineering work; and, as a beginning, the members of the Profession subscribed a fund of \$10 000 for starting this work. We felt, of course, that this amount was far too small to carry out the object, and we then turned to our brothers in the East, to our fellow-members in the Eastern Associations, and through the hearty co-operation of the Secretary of this Society, and those of the other Engineering Societies, a guarantee fund was established which enabled us to go ahead with the work.

A local committee was organized, and I know that all of you have received the circulars which outline the scope of the work. A number of volumes, which we believe will be of high professional interest, will be published.

The expenses have been large, of course. We had counted on a large participation on the part of the engineers from foreign countries, and for reasons well known to all of you, we will probably be disappointed. That means that the Congress which it was intended should be very largely international, will be so to a somewhat less extent; but at the same time we have assurances of papers from those

International
Engineering
Congress.

International
Engineering
Congress
(continued).

of our colleagues who are not otherwise engaged. The duty of supplementing this lacuna will fall, therefore, in a larger measure upon you, the members of our American Associations.

A special appeal has been made by Mr. A. M. Hunt, member of this Society and Chairman of the Publication Committee, to a number of the engineers in this country to furnish additional papers. We feel sure that such contributions will be equal in value, to all of you as members of the Profession, to those which might have been furnished by our foreign members.

I have in my pocket a statement of the number of members who, up to the present time, have joined the Congress.

Mr. Cattell, also a valued member of this Society, has sent you circulars, and has called attention to the fact that the membership fee in the Congress, which carries with it the receipt of one of the volumes of the *Transactions*, is only \$5.

The first volume, which deals with the work carried out on the Panama Canal, will undoubtedly be one which each of you ought to feel proud to have in your engineering library. I think it is only necessary for me to read the list of subscriptions received to convince some of you that, unfortunately, in the rush of business, because of excessive employment, you have overlooked your duty of joining this Congress.

Let me state that the number of engineering and technical societies which have been corresponded with for participation in the Congress, is 325. Out of this total, 230 have responded. These societies have appointed delegates: in the United States, three; from Great Britain there is to be one; from Hungary, one. The total number of subscriptions to date is 2 361. I wish I might be able to add a cipher beyond that 1. 1 598 from the United States and possessions and 663 from foreign countries. 649 members of the American Society of Civil Engineers are enrolled in this Congress, scarcely 10% of our membership. 48 foreign countries are represented in the membership, and the following have the largest number of members: Canada, 86; Great Britain, 79; Holland, 26; France, 56; Germany, 59; Brazil, 30; Australia, 34; Japan, 34; Russia, 22; the Argentine Republic, 20; and India, 20.

The enrollment in the United States from States credited with more than 20 members is as follows: California, 352; New York, 326; Pennsylvania, 135; Illinois, 83; Massachusetts, 68; Ohio, 48; New Jersey, 41; Washington on the Coast, 35; Washington, D. C., 34; Oregon, 31; Missouri, 30; Colorado, 27; Michigan, 25; and Virginia, 20.

Approximately 320 papers were expected before the declaration of war; but at the present date only 225 may be counted on, although there is still the hope of securing a few from certain countries abroad.

The participation of foreign Societies from the warring zone is

almost an impossibility, although a request has been received from at least one Society in England, asking information as to the steps to be taken to appoint delegates to the Congress.

Contributions from abroad have already been received. I will not bother you with the list of those, but will state that they are coming in. Enrollment in the Congress is proceeding very actively, considering the present condition; and if active work is kept up, we hope to have an enrollment of 4 000.

I make a special plea on behalf of the International Engineering Congress, that you support it to the best of your ability. I assure you that if you come out there, and I hope many of you will, you will be met with the most hearty welcome. I thank you.

THE PRESIDENT.—The time has now arrived for your President to surrender his gavel to his successor. I will appoint Past-Presidents C. C. Schneider and Charles Macdonald, a Committee to conduct our new President to the Chair.

Gentlemen, I have the honor of introducing our new President, Mr. Charles D. Marx. President Marx
takes the
Chair.

PRESIDENT MARX.—Members of the Society: With a full appreciation of the high honor conferred, I thank you. Counting upon the hearty co-operation of the members of the Board of Direction, and relying upon their wisdom and experience, I propose to further the interests of this Society to the best of my ability.

The Secretary has an announcement to make.

THE SECRETARY.—The President wishes me to announce that a meeting of the Board of Direction will be held at 2 o'clock in the Board Room, and asks that all members of the Board be there as promptly as possible at that hour. Directly after adjournment, luncheon will be served.

THE PRESIDENT.—Is there any more business to come before us at the present time?

THE SECRETARY.—Not that I have, sir.

THE PRESIDENT.—If not, a motion to adjourn is in order. We stand adjourned. Adjourned.

**EXCURSIONS AND ENTERTAINMENTS
AT THE SIXTY-SECOND ANNUAL MEETING**

Wednesday, January 20th, 1915.—After the Business Meeting, lunch for about 800 members was served at 1 P. M. at the Society House.

At 3 P. M., through the courtesy of the Public Service Commission for the First District, Alfred Craven, M. Am. Soc. C. E., Chief Engineer, and the contractors for Sections 11, 12, and 13 of the new subway on Lexington Avenue, Manhattan, about 400 members made an inspection trip from 93d to 129th Streets.

At 9 P. M., there was a Reception, with dancing, at the Hotel Astor, at which the attendance was 717.

Thursday, January 21st, 1915.—The day was devoted to an excursion over a portion of the Long Island Railroad. A party of about 570 left the Pennsylvania Station at 9.45 A. M. on a special train which passed through the East River Tunnel to the Sunnyside Yard, and thence to Winfield Junction (where an extensive cut-off is being constructed), and then to Flushing and to Great Neck, the elimination of a number of grade crossings being viewed *en route*. The train then returned to Winfield Junction and switched south to Jamaica where the extensive improvements in connection with the new Jamaica Terminal were inspected.

From Jamaica the train returned to Long Island City over the Montauk Division to Glendale Junction, and thence over the Glendale Cut-off to the Main Line and west to the Montauk Cut-off, crossing above the portals of the East River Tunnels, from which point an interesting view of Sunnyside Yard was obtained. The train then proceeded *via* the Montauk Division to Bushwick Junction, where a four-track depression of the railroad is under way to eliminate grade crossings.

At Bushwick Junction, by invitation of W. H. Gahagan, M. Am. Soc. C. E., the party had lunch at "Trommers", and subsequently inspected the work being done in that locality.

The party left East New York at 2.30 P. M., and *en route* to Bay Ridge, a stop was made to inspect the reconstruction of the Sea Beach Railway for the New York Municipal Railway Company as a four-track depressed line from its connection with the Rapid Transit Subway at 65th Street and Fourth Avenue, Brooklyn, to a point south of 86th Street, a distance of about $4\frac{1}{2}$ miles.

Proceeding to Bay Ridge, the party was conveyed by ferry to the Long Island Railroad Dock at East 34th Street, Manhattan, arriving at about 5 P. M.

In the evening, at the Society House, at 8 P. M., there was a Lecture by Professor Lawrence D. Kitchell, on the Glacier National Park,

Montana, illustrated with lantern slides and motion pictures. This was followed by a social and informal Smoker, at which the attendance was about 860.

The following list contains the names of 927 members of various grades who registered as being in attendance at the Annual Meeting. The list is incomplete, as some members failed to register, and it does not contain the names of any of the guests of the Society or of individual members. The number of ladies and other guests is estimated at about 700.

Abbott, C. P.	White Plains, N. Y.	Barnes, O. F.	Jersey City, N. J.
Abbott, Hunley . . .	New York City	Barnes, W. E.	Boston, Mass.
Ackerman, J. W. . .	Auburn, N. Y.	Barnett, R. P.	New York City
Addis, W. G.	Winthrop, Mass.	Barney, P. C.	Brooklyn, N. Y.
Aiken, W. A.	New York City	Barney, W. J.	New York City
Aims, W. I.	New York City	Bascome, W. R. . . .	New York City
Alderson, A. B. . .	Hartford, Conn.	Basinger, J. G. . . .	New York City
Alexander, H. J. . .	New York City	Baum, George	Yonkers, N. Y.
Allen, E. Y.	Orange, N. J.	Bean, G. L.	Philadelphia, Pa.
Allen, F. W.	White Plains, N. Y.	Beaty, R. E.	New York City
Allen, H. D.	Newark, N. J.	Becker, E. J.	Schenectady, N. Y.
Allen, Kenneth . . .	New York City	Becker, R. C.	New York City
Ammann, O. H.,		Beebe, H. R.	Utica, N. Y.
	New Brighton, N. Y.	Beekman, J. V., Jr.	Boston, Mass.
Andrew, C. R.,		Beggs, G. E.	Princeton, N. J.
	New Matamoras, Ohio	Belden, E. T.	Pittsfield, Mass.
Appel, H. A.	New York City	Belknap, F. W. . . .	New York City
Armstrong, R. S. . .	Brooklyn, N. Y.	Belknap, J. M. . . .	Manhasset, N. Y.
Arnold, W. H. . . .	New York City	Bendel, Jacob	New York City
Ashley, Carl	New York City	Benedict, F. N.,	
Ashmead, P. H. . .	New York City		Mount Vernon, N. Y.
Atkinson, Asher,		Bensel, J. A.	Bernardsville, N. J.
	New Brunswick, N. J.	Bentley, J. C. . . .	Cambridge, Md.
Atwood, T. C. . . .	New Haven, Conn.	Berger, Bernt	New York City
Auryansen, Frederick,		Berger, John	New York City
	Jamaica, N. Y.	Bettes, C. R.	Far Rockaway, N. Y.
Ayres, Q. C.	Columbus, Miss.	Betts, R. T.	New York City
		Bevan, L. J.	New York City
Babcock, W. S. . . .	New York City	Bigelow, W. W. . . .	Springfield, Mass.
Baird, H. C.	New York City	Bilyeu, C. S.	New York City
Baldwin, W. J. . . .	Brooklyn, N. Y.	Blackmore, G. G. . .	New York City
Ball, L. A.	New York City	Blair, Alexander . . .	Summit, N. J.
Ballinger, W. F. . .	Philadelphia, Pa.	Blair, C. M.	New Haven, Conn.
Bamford, W. B. . . .	Belmar, N. J.	Blakeley, G. H.,	
Barnes, M. G.	Albany, N. Y.		South Bethlehem, Pa.

Blakeslee, Clarence, New Haven, Conn.	Brooks, J. P.Potsdam, N. Y.
Blakeslee, H. L., New Haven, Conn.	Brown, R. H.New York City
Blanchard, A. H. . . .New York City	Brown, S. P., Montreal, Que., Canada
Blatch, N. S.New York City	Brush, W. W.Brooklyn, N. Y.
Blatt, Max.New York City	Bryan, C. W.New York City
Boardman, C. S. . . .Buffalo, N. Y.	Buck, R. S.New York City
Boardman, W. H. . . .Newark, N. J.	Buettner, O. G. H. . .New York City
Boes, F. C.New York City	Burdett, F. A.New York City
Bogart, John.New York City	Burgess, G. H.Albany, N. Y.
Bogert, C. L.New York City	Burnham, F. W.New York City
Bogue, V. G.New York City	Burpee, G. W.New York City
Bolger, E. G.Altoona, Pa.	Burpee, Moses.Houlton, Me.
Boller, A. P., Jr., East Orange, N. J.	Burr, W. H.New York City
Bond, G. M.Hartford, Conn.	Burroughs, H. R. . . .New York City
Boniface, Arthur. . .Scarsdale, N. Y.	Bush, E. W.Hartford, Conn.
Bontecou, Daniel, Kansas City, Mo.	Bush, Lincoln. . .East Orange, N. J.
Booth, G. W.New York City	Buss, A. S.High Falls, N. Y.
Booz, H. C.Philadelphia, Pa.	Butler, M. J., Montreal, Que., Canada
Bortin, Harry. . . .Brooklyn, N. Y.	
Boucher, W. J.New York City	Cadwallader, W. L., New York City
Bouton, H. R.New York City	Caldwell, F. E.Newton, N. J.
Bowditch, J. H., New Brighton, N. Y.	Cappelen, F. W., Minneapolis, Minn.
Bowman, A. L.New York City	Carey, E. G.White Plains, N. Y.
Boyd, R. W.New York City	Carmalt, L. J.Hartford, Conn.
Brace, J. H.Cedars, Que., Canada	Carpenter, A. W. . . .Yonkers, N. Y.
Brackett, Dexter. . .Boston, Mass.	Carpenter, C. E. . . .Yonkers, N. Y.
Bradbury, R. R., East Pleasantville, N. Y.	Carr, Albert.East Orange, N. J.
Bradley, F. E.New York City	Carstarphen, F. C. . .Trenton, N. J.
Brainerd, H. A. . . .Westfield, N. J.	Casani, A. A.New York City
Bramwell, G. W. . . .New York City	Catlin, H. B.New York City
Braslow, Barnett. . .New York City	Chambers, R. H. . . .Flushing, N. Y.
Brendlinger, P. F., Philadelphia, Pa.	Chappell, T. F.New York City
Brennan, J. G.Albany, N. Y.	Chase, C. F.New Britain, Conn.
Brennan, J. L.New York City	Christian, G. L.New York City
Breuchaud, Jules. . .New York City	Church, E. C.New York City
Briggs, J. A.New York City	Church, F. B.Great Neck, N. Y.
Briggs, W. C.Brooklyn, N. Y.	Claffin, W. B., West Redding, Conn.
Britton, G. C.Brockwayville, Pa.	Clapp, O. F.Providence, R. I.
	Clapp, S. K.Ashokan, N. Y.
	Clark, A. E.White Plains, N. Y.

- Clarke, E. W. . . . Pleasantville, N. Y.
 Clarke, G. C.,
 Richmond Hill, N. Y.
 Clement, S. B.,
 North Bay, Ont., Canada
 Closson, W. G. . . . Brooklyn, N. Y.
 Codwise, H. R. . . . Brooklyn, N. Y.
 Cohen, A. B. . . . Hoboken, N. J.
 Cohen, F. W.,
 Upper Montclair, N. J.
 Cole, E. S. New York City
 Cole, G. N. New York City
 Coleman, J. F. . . . New Orleans, La.
 Collier, B. C. New York City
 Coltman, Robert, Jr.,
 Elmhurst, N. Y.
 Comber, S. X. New York City
 Condron, T. L. Chicago, Ill.
 Connell, H. L. New York City
 Connell, W. H. . . . Philadelphia, Pa.
 Connelly, J. A. A. . . New York City
 Connor, E. H. . . . Leavenworth, Kans.
 Constant, F. H. . . . Princeton, N. J.
 Cook, F. S. Yonkers, N. Y.
 Cook, J. H. Paterson, N. J.
 Coombs, R. D. New York City
 Coombs, S. E. Yonkers, N. Y.
 Cooper, C. W. New York City
 Cooper, D. R. Caldwell, Ohio
 Corning, D. T. Troy, N. Y.
 Corthell, E. L.,
 North Egremont, Mass.
 Coyne, H. L. Woodhaven, N. Y.
 Crane, A. S. New York City
 Crane, C. A. New York City
 Crane, F. E. Amsterdam, N. Y.
 Crehore, W. W. . . . New York City
 Cresson, B. F., Jr.,
 Jersey City, N. J.
 Creuzbaur, R. W. . . Brooklyn, N. Y.
 Crocker, H. S. Denver, Colo.
 Crocker, J. R. New York City
 Crooks, C. H. New York City
 Crosby, W. W. Baltimore, Md.
 Crowell, F. S. Flushing, N. Y.
 Crowell, Foster. . . . New York City
 Cuddeback, A. W. . . Paterson, N. J.
 Cullen, J. F. Philadelphia, Pa.
 Culyer, T. C. Purdy Station, N. Y.
 Cummings, Noah. . . New York City
 Cummings, R. A. . . Pittsburgh, Pa.
 Curtis, C. E. Cleveland, Ohio
 Curtis, F. S. Boston, Mass.
 Cushing, W. C. . . . Pittsburgh, Pa.
 Cutler, L. G. East Orange, N. J.
 Dailey, J. A. East Orange, N. J.
 Dakin, A. H., Jr. . . New York City
 Dallis, P. A. Atlanta, Ga.
 Dana, R. T. New York City
 Davies, J. P. New York City
 Davies, J. V. Flushing, N. Y.
 Davis, B. H. New York City
 Davis, J. L. Manchester Center, Vt.
 Dean, A. W. Boston, Mass.
 de Mey, E. J. B. . . Cincinnati, Ohio
 Develin, R. G. . . . Philadelphia, Pa.
 Devlin, H. S. Newark, N. J.
 de Wyrall, Cyril,
 Ridgefield Park, N. J.
 Deyo, S. L. F. New York City
 Diamant, A. H. . . . New York City
 Dibert, H. McM. . . . Troy, N. Y.
 Diebitsch, Emil. . . . Nutley, N. J.
 Dimon, D. Y. New York City
 Dixon, G. G. Kent, Ohio
 Dodge, S. D. Brooklyn, N. Y.
 Donham, B. C. . . . Glen Ridge, N. J.
 Donle, E. R. Belmont, Mass.
 Doolittle, F. W. . . . New York City
 Doron, C. S. Brooklyn, N. Y.
 Dougherty, R. E.,
 White Plains, N. Y.
 Douglass, A. C.,
 Niagara Falls, N. Y.
 Doyen, G. E. New York City
 Drayton, Newbold,
 Philadelphia, Pa.
 Drew, C. D. Flushing, N. Y.
 Dunn, H. L. New London, Conn.

- Durant, Aldrich...New York City
 Durfee, J. J.....Brooklyn, N. Y.
 Durham, H. W....New York City
 Durham, Leicester.Scarsdale, N. Y.
 Dykeman, C. F....Brooklyn, N. Y.
 Earle, Thomas.....Steelton, Pa.
 Easterbrook, F. J.,
 New Haven, Conn.
 Eckersley, J. O....New York City
 Eddy, H. P.....Boston, Mass.
 Edmondson, R. S..New York City
 Edwards, D. G....Brooklyn, N. Y.
 Edwards, J. H.....Passaic, N. J.
 Ehrbar, L. H.....Newark, N. J.
 Eide, Torris.....New York City
 Ellis, H. C....White Plains, N. Y.
 Ellis, J. W.....Woonsocket, R. I.
 Elmer, H. N.....Chicago, Ill.
 Ely, G. W., Jr....New York City
 Emerson, K. B....New York City
 Endicott, M. T..Washington, D. C.
 Esselstyn, H. H...Detroit, Mich.
 Ewing, W. W.....Westfield, N. J.
 Farley, G. P....Garden City, N. Y.
 Farley, M. M.....New York City
 Farnham, A. B....Pittsfield, Mass.
 Farrington, H. P..New York City
 Fay, F. H.....Boston, Mass.
 Feigel, J. H.....Buffalo, N. Y.
 Feiner, M. A.....New York City
 Ferguson, L. R..Philadelphia, Pa.
 Ferry, C. A....New Haven, Conn.
 Fetherston, J. T..New York City
 Files, T. H.....New York City
 Finch, J. K.....New York City
 Firth, E. W.....New York City
 Fischer, Charles, Jr.New York City
 Fisher, E. A....Rochester, N. Y.
 Fisher, H. T.,
 Montreal, Que., Canada
 Fitch, C. L.....Chicago, Ill.
 Fletcher, Robert...Hanover, N. H.
 Flinn, A. D.....Yonkers, N. Y.
 Ford, H. C.....New York City
 Ford, W. H....Philadelphia, Pa.
 Fort, E. J.....Brooklyn, N. Y.
 Foss, F. E.....New York City
 Foster, E. H.....New York City
 Fox, W. F.....New York City
 Franklin, C. M....New York City
 Freeman, M. H....Brooklyn, N. Y.
 French, A. W....Worcester, N. Y.
 French, Halsey..Brooklyn, N. Y.
 French, J. B.....New York City
 Frost, G. H.....Plainfield, N. J.
 Frost, G. S.....Brooklyn, N. Y.
 Fuller, G. W.....New York City
 Fuller, W. B.....Paterson, N. J.
 Fuller, W. E.....New York City
 Gagel, Edward..West Haven, Conn.
 Gahagan, W. H....Brooklyn, N. Y.
 Gardiner, F. W....Yonkers, N. Y.
 Gardner, Warren..New York City
 Garfield, C. A..White Plains, N. Y.
 Gartensteig, Charles,
 New York City
 Gaston, L. P.....New York City
 Gay, H. S.....Bayonne, N. J.
 Gerhard, N. P....Scarsdale, N. Y.
 Gifford, G. E.....New York City
 Gildersleeve, A. C.New York City
 Giles, J. A....Binghamton, N. Y.
 Giles, Robert.....New York City
 Gillen, W. J.....New York City
 Gillespie, R. H....New York City
 Gilman, Charles...New York City
 Glover, P. H....Harrington, Me.
 Godfrey, Hollis..Philadelphia, Pa.
 Goldmark, Henry..New York City
 Goldsborough, J. B.New York City
 Goldsmith, William.New York City
 Gons, L. R.....Wilmington, Del.
 Goodell, J. M....Worcester, Mass.
 Goodman, Joseph..New York City
 Goodman, Louis...New York City
 Goodsell, D. B....Brooklyn, N. Y.
 Goodwin, R. E....New York City

Govern, E. J.	Rochester, N. Y.	Harris, H. F.	Trenton, N. J.
Gowen, J. F.	Ossining, N. Y.	Harte, C. R.	New Haven, Conn.
Graham, G. A.	New York City	Hartman, A. H.	Baltimore, Md.
Granbery, J. H.	New York City	Hartmann, E. F.	New York City
Gray, Edward.	Richmond, Va.	Harwi, S. J.	Bayonne, N. J.
Gray, William.	New York City	Harwood, G. A.	New York City
Greathead, J. F.,		Hasbrouck, Oscar.	Hudson, N. Y.
	White Plains, N. Y.	Haskell, E. E.	Ithaca, N. Y.
Green, C. N.	New York City	Haskins, W. J.	New York City
Greene, Carleton.	New York City	Hauck, William.	New York City
Greenlaw, R. W.	New York City	Hawley, J. B.	Fort Worth, Tex.
Gregg, J. H. C.	Brooklyn, N. Y.	Hazelton, C. W.,	
Gregory, J. H.	New York City		Montague City, Mass.
Gregory, W. B.	New Orleans, La.	Hazen, Allen.	New York City
Greiner, J. E.	Baltimore, Md.	Hazen, R. W.	Whitefield, N. H.
Guttridge, J. A.	New York City	Hazen, W. N.	Orange, N. J.
		Healy, J. P.	Washington, D. C.
Haas, P. L.	New York City	Healy, J. R.	New York City
Hale, H. M.	Brooklyn, N. Y.	Heilbronner, L. C.	Utica, N. Y.
Hall, J. L.	Seattle, Wash.	Heiser, A. B.	New York City
Hall, M. W.	New York City	Heiser, W. J.	New York City
Hall, W. H.	New Britain, Conn.	Heller, J. W.	Newark, N. J.
Hallock, J. C.	Newark, N. J.	Henry, P. W.	New York City
Halsey, W. H.,		Hermanns, F. E.	New York City
	Bridgehampton, N. Y.	Herschel, Clemens.	New York City
Hamilton, J. W.	New York City	Hewes, V. H.	New York City
Hammel, E. F.	New York City	Hewett, B. H. M.	New York City
Hammond, C. A.,		Hewitt, George.	New York City
	Mount Vernon, N. Y.	Higgins, C. H.	New York City
Hammond, G. T.	Brooklyn, N. Y.	Higgins, J. W.	Roselle Park, N. J.
Hammond, J. F.,		Hildreth, J. L., Jr.,	
	Richmond Hill, N. Y.		Jersey City, N. J.
Hanavan, W. L.,		Hilton, J. C.	New York City
	Long Island City, N. Y.	Hinman, L. R.	Denver, Colo.
Hanmer, H. J.	Gloversville, N. Y.	Hitchcock, F. C.	New York City
Hansel, Charles.	Cranford, N. J.	Hoag, S. W., Jr.	New York City
Hansen, Paul.	Urbana, Ill.	Hodgdon, F. W.	Boston, Mass.
Harby, Isaac.	Richmond Hill, N. Y.	Hodge, H. W.	New York City
Harding, H. S.	New York City	Hogan, J. P.	Tompkinsville, N. Y.
Haring, Alexander.	New York City	Holbrook, A. R.	Brooklyn, N. Y.
Harps, H. M.	Perth Amboy, N. J.	Holbrook, Percy.	New York City
Harrington, J. L.	Kansas City, Mo.	Holden, C. A.	Hanover, N. H.
Harris, B. B.	New York City	Holden, C. A.	Mount Vernon, N. Y.
Harris, F. R.	Brooklyn, N. Y.	Holdredge, N. C.	New York City
Harris, G. H.	Detroit, Mich.	Holland, C. M.	Brooklyn, N. Y.

Holtzman, S. F.,	Johannesson, Sigvald,
Hastings-on-Hudson, N. Y.	Upper Montclair, N. J.
Hone, A. C. New York City	Jonah, F. G. St. Louis, Mo.
Honness, G. G. . . . Ashokan, N. Y.	Jones, R. S. New York City
Hoover, A. P. Paterson, N. J.	Jones, S. R. New York City
Horton, R. E. Albany, N. Y.	Jonson, E. F. New York City
Hough, D. L. Petrograd, Russia	Jordan, L. C. Brooklyn, N. Y.
Hough, U. B. Spokane, Wash.	Just, G. A. Long Island City, N. Y.
Houston, J. J. L. . . Jamaica, N. Y.	
Houston, W. O. . . . Jackson, Mich.	Karner, W. J. New York City
Hovey, O. E. New York City	Kaufman, Gustave. New York City
Howard, L. T. New York City	Keefe, D. A. Athens, Pa.
Howard, O. Z. New York City	Keefer, C. H. Ottawa, Ont., Canada
Howell, W. A. Newark, N. J.	Keith, H. C. New York City
Howes, C. P.,	Kelley, W. D. Yonkers, N. Y.
South Yarmouth, Mass.	Kellogg, R. C. . . . Brooklyn, N. Y.
Howes, D. W. Brooklyn, N. Y.	Kelly, C. W. New Haven, Conn.
Hubbard, Daniel. . Baltimore, Md.	Kelly, H. A. Jersey City, N. J.
Hubbard, W. D.,	Khuen, Richard. . . Pittsburgh, Pa.
Brown Station, N. Y.	Kienle, J. A. New York City
Hubbell, G. S. New York City	Kimball, F. C. Summit, N. J.
Hudson, C. W. Montclair, N. J.	Kimball, G. H. Detroit, Mich.
Hudson, H. W. New York City	King, E. T. Arrochar, N. Y.
Hulsart, C. R. New York City	Kinney, W. M. Chicago, Ill.
Humphrey, R. L. Philadelphia, Pa.	Kinsey, W. A. Newark, N. J.
Hunt, A. M. . San Francisco, Cal.	Kirchgraber, E. H. New York City
Hunt, C. E. New York City	Kirchner, P. A. . . . New York City
Hunt, Charles Warren,	Kirkwood, H. C. . . . New York City
New York City	Kittredge, G. W. . . Yonkers, N. Y.
Hurd, H. L. . . . White Plains, N. Y.	Kittredge, H. C. . . Rochester, N. Y.
Hurlbut, C. C. . . . Montclair, N. J.	Knighton, J. A. . . . New York City
Hurley, J. P. Brooklyn, N. Y.	Knowles, Morris. . . Pittsburgh, Pa.
Hyde, H. E. Ithaca, N. Y.	Knox, S. B. New York City
Hyde, J. L. Westfield, Mass.	Kolb, H. J. Brooklyn, N. Y.
	Kornfeld, A. E. . . . New York City
Ilsley, A. B. . . . Washington, D. C.	Krellwitz, D. W. . . . New York City
Isaacs, J. D. New York City	Kuehnle, W. L. . . . New York City
Jackson, J. F. . . . New Haven, Conn.	La Chicotte, H. A. Brooklyn, N. Y.
Jacobs, R. H. New York City	Lackey, O. F. Baltimore, Md.
Jarrett, E. S. New York City	Lake, E. N. Chicago, Ill.
Jenkins, J. E. New York City	Lamson, W. M. . . . Brooklyn, N. Y.
Joachimson, Martin,	Landreth, O. H. Schenectady, N. Y.
New York City	Lang, F. A. New York City
	Lange, T. F. New York City

Langthorn, J. S.	New York City	Macdonald, Charles,	Brooklyn, N. Y.
Lannan, L. E.	Mount Vernon, N. Y.	MacFeeters, J. O.	Glen Ridge, N. J.
Latimer, C. A.	Ambridge, Pa.	MacGregor, R. A.	New York City
Lavis, Fred.	New York City	Machen, H. B.	New York City
Lawrence, E. V.	New York City	Mack, P. W.	New York City
Lee, E. M.	New York City	Macnab, G. T.	New York City
Lee, W. B.	New York City	McComb, D. E.	Washington, D. C.
Leeds, C. T.	Los Angeles, Cal.	McCormack, E. W.,	Washington, D. C.
Leighton, George.	Glenburn, Pa.	McDonald, Hunter,	Nashville, Tenn.
Leiser, Ferdinand, Jr.,	Brooklyn, N. Y.	McDowell, F. F.	Yonkers, N. Y.
Leonard, H. R.	Philadelphia, Pa.	McEntire, Lloyd.	Frenchtown, N. J.
Leser, Henry.	New York City	McKenzie, T. H.,	Southington, Conn.
Lesley, R. W.	Philadelphia, Pa.	McLoughlin, F. O. X.,	New York City
Letson, T. H.	New York City	McLure, N. R.	Phoenixville, Pa.
Lewis, E. W.	New Haven, Conn.	McMinn, T. J.	New York City
Lewis, N. P.	New York City	McMullen, R. W.,	New Canaan, Conn.
Lex, W. I.	Philadelphia, Pa.	McNab, William,	Montreal, Que., Canada
Lichtenstein, Harry,	New York City	McNaugher, D. W.	Pittsburgh, Pa.
Lindau, A. E.	Winnetka, Ill.	McPherson, R. H.	New York City
Lindenthal, Gustav.	New York City	Madden, J. H.	New York City
Lindholm, C. B.	Pittsfield, Mass.	Malmquist, E. A.	New York City
Linton, W. P.	New York City	Malukoff, A. J.	New York City
Llewellyn, F. T.	New York City	Manahan, E. G.	New York City
Lobo, Carlos.	Brooklyn, N. Y.	Manley, L. B.	Boston, Mass.
Loewenstein, Jacob.	New York City	Mann, J. L.	Rosebank, N. Y.
Logan, W. S.	Arlington, N. J.	Mansfield, W. H.	Troy, N. Y.
Longley, F. F.	New York City	Marsh, F. B.	Crestwood, N. Y.
Look, M. J.	Brown Station, N. Y.	Martin, B. C.	Poughkeepsie, N. Y.
Loomis, Horace.	New York City	Martin, E. S.	New York City
Loomis, L. B.	New York City	Marx, C. D.,	Stanford University, Cal.
Lorah, W. L.	Brooklyn, N. Y.	Mason, Francis.	New York City
Loughran, J. F.	Kingston, N. Y.	Matheson, J. D.	New York City
Lovell, E. B.	Montclair, N. J.	Matlaw, I. S.	New York City
Loweth, C. F.	Chicago, Ill.	Mayper, Victor.	New York City
Lowinson, Oscar.	New York City	Meadowcroft, William,	New York City
Lucas, G. L.	New York City	Meeker, R. A.	Plainfield, N. J.
Lundgren, Leonard.	Portland, Ore.		
Lundie, John.	New York City		
Lynde, Clifford.	Brooklyn, N. Y.		
Lyons, H. C.	Flushing, N. Y.		

- Meggy, R. L. G....Fanwood, N. J. Murray, J. F....Philadelphia, Pa.
 Mehren, E. J.....New York City Myers, C. H.....New York City
 Meigs, John.....Philadelphia, Pa. Myers, J. H...White Plains, N. Y.
 Melius, L. L.....New York City
 Menke, William...New York City
 Merriman, Mansfield,
 New York City
 Merriman, R. M.,
 Central Valley, N. Y.
 Merriman, Thaddeus,
 New York City
 Metcalf, Leonard....Boston, Mass.
 Michael, H. L.....Buffalo, N. Y.
 Middlebrook, C. T...Albany, N. Y.
 Miller, Frank.....Passaic, N. J.
 Miller, Hugh.....Potsdam, N. Y.
 Miller, H. A.....Boston, Mass.
 Miller, M. M.....New York City
 Miller, R. P.....New York City
 Mitchell, S. P....Philadelphia, Pa.
 Mogensen, O. E...Plainfield, N. J.
 Molitor, F. A.....New York City
 Monsarrat, C. N.,
 Montreal, Que., Canada
 Montfort, Richard..Louisville, Ky.
 Moore, E. J.....Yonkers, N. Y.
 Moore, F. F...Hawthorne, N. Y.
 Moore, L. E.....Boston, Mass.
 Moore, S. W...East Elmhurst, N. Y.
 Moore, W. H...New Haven, Conn.
 Morrill, G. P.,
 Sagua la Grande, Cuba
 Morrison, H. J...Amsterdam, N. Y.
 Morrison, W. H., Jr.,
 Brooklyn, N. Y.
 Morse, C. F.....Watertown, N. Y.
 Morse, C. M.....Buffalo, N. Y.
 Morssen, C. M.,
 Montreal, Que., Canada
 Morton, W. S.....New York City
 Moulton, O. M.....Gorham, Me.
 Mozart, W. J....Westboro, Mass.
 Murphy, F. E.,
 West New Brighton, N. Y.
 Murphy, J. F..Tompkinsville, N. Y.
- Neely, W. R....Tarrytown, N. Y.
 Nelson, A. H...Atlantic City, N. J.
 Nelson, J. C.....New York City
 Nelson, J. W.....New York City
 Neuman, D. L....New York City
 Neumeyer, R. E...Bethlehem, Pa.
 Newell, F. H..Washington, D. C.
 Newhall, H. L....New York City
 Nial, W. A.....Troy, N. Y.
 Nichols, C. H...New Haven, Conn.
 Noble, F. C.....Brooklyn, N. Y.
 Northrop, A. A...New York City
 Oakley, G. I....Little Falls, N. Y.
 Obreiter, J. W...Bloomfield, N. J.
 O'Brien, J. H.,
 Montreal, Que., Canada
 Ockerson, J. A....St. Louis, Mo.
 Ockert, F. W....New York City
 O'Connell, G. P...Holyoke, Mass.
 O'Connor, C. J...New York City
 O'Connor, J. A....Albany, N. Y.
 Ogden, H. N.....Ithaca, N. Y.
 Ogden, J. C.....New York City
 Okeson, W. R....Orange, N. J.
 Olmsted, A. E....New York City
 Olmsted, H. W....New York City
 Opdyke, S. B., Jr..New York City
 O'Rourke, J. F...New York City
 Orrok, G. A.....New York City
 Ott, S. J.....Rutherford, N. J.
 Overocker, D. W....Troy, N. Y.
 Owen, James.....Newark, N. J.
 Paddock, H. C....New York City
 Palmer, S. B.....Norwich, Conn.
 Parker, C. J....Bronxville, N. Y.
 Parker, J. L.....New York City
 Parker, W. P.....New York City
 Parlin, R. W....Brooklyn, N. Y.

Parmley, W. C., Upper Montclair, N. J.	Quinn, M. F. New York City
Parsons, H. de B. . . New York City	Rankin, E. S. Newark, N. J.
Peabody, W. W., White Plains, N. Y.	Ray, G. J. East Orange, N. J.
Pegram, G. H. New York City	Reed, H. B. New York City
Pemoff, J. J. New York City	Reeves, W. F. New York City
Pendlebury, Edward, Arlington, N. J.	Reid, H. A. Jamaica, N. Y.
Perrine, George. . . . New York City	Rennell, H. H. . . . New York City
Perrine, Harold. . . . New York City	Requardt, G. J. . . . Baltimore, Md.
Perry, F. W. Brooklyn, N. Y.	Reynolds, A. M. . . . Glen Ridge, N. J.
Perry, J. P. H. New York City	Reynolds, J. O. . . . Brooklyn, N. Y.
Pfau, J. W. New York City	Rhett, A. H. Brooklyn, N. Y.
Philips, G. W. Flushing, N. Y.	Rice, G. S. New York City
Philips, J. H. Glen Ridge, N. J.	Richardson, Clifford, New York City
Pierce, F. E. New York City	Richardson, J. D. . . . Corona, N. Y.
Pirnie, H. M. Springfield, Mass.	Richardson, J. H. . . . Boston, Mass.
Pollock, C. D. New York City	Richardson, T. F., Rutherford, N. J.
Pomeroy, L. R. New York City	Ridgway, Robert. . . . New York City
Pommerer, R. W., Mount Vernon, N. Y.	Riedel, J. C. Brooklyn, N. Y.
Pond, F. H. Brooklyn, N. Y.	Rights, L. D. New York City
Pond, H. O. Tenafly, N. J.	Ripley, H. L. Brockton, Mass.
Poole, C. A. Rochester, N. Y.	Ripley, Joseph. Albany, N. Y.
Porter, H. G. New York City	Ripley, T. M. Watertown, N. Y.
Porter, J. E. Yonkers, N. Y.	Robbins, F. H. New York City
Porter, J. M. Easton, Pa.	Roberts, R. F. Nutley, N. J.
Potter, Alexander. . . New York City	Robinson, E. F. . . . New York City
Potts, Clyde. Morristown, N. J.	Robinson, G. L. . . . New York City
Powelson, W. V. N. . . New York City	Robinson, Harry, West Haven, Conn.
Powers, C. V. V. . . . New York City	Rockwood, N. C. . . . Brooklyn, N. Y.
Pratt, A. H. White Plains, N. Y.	Rogers, A. W. Rochester, N. Y.
Pratt, F. E. Glen Ridge, N. J.	Rogers, E. H. West Newton, Mass.
Preston, G. H. New York City	Rogge, J. C. L. . . . Katonah, N. Y.
Preston, H. W. Elmira, N. Y.	Rohrer, Grant. . . . New York City
Price, Frank. Glen Cove, N. Y.	Rosenberg, Friedrich, Montclair, N. J.
Price, F. O. Brooklyn, N. Y.	Rothrock, W. P. . . . New York City
Priest, B. B. East Orange, N. J.	Rugg, W. F. Peekskill, N. Y.
Proctor, R. F. Baltimore, Md.	Rust, H. P. New York City
Purver, G. M. Brooklyn, N. Y.	Ryan, M. H. New York City
Quimby, H. H. . . . Philadelphia, Pa.	Sackett, A. J. New York City
Quimby, J. H. Pearl River, N. Y.	Sanborn, F. B. . . . Tufts College, Mass.
Quincy, Edmund. . . . New York City	

- Sanborn, J. F....New York City
 Sargent, E. H.....Albany, N. Y.
 Saville, C. M....Hartford, Conn.
 Schall, F. E. .South Bethlehem, Pa.
 Schermerhorn, H. O. .Troy, N. Y.
 Schmidt, H. H. .Brooklyn, N. Y.
 Schneeweiss, A. E. .Newark, N. J.
 Schneider, C. C. .Philadelphia, Pa.
 Schroeder, F. C. .New York City
 Schwarze, C. T.,
 South Orange, N. J.
 Scorgie, J. C....Cambridge, Mass.
 Seabury, G. T. White Plains, N. Y.
 Seage, C. E. .New Brighton, N. Y.
 Seaman, H. B....Brooklyn, N. Y.
 Searle, C. D.....New York City
 Seaver, Clifford...New York City
 Selby, O. E.....Cincinnati, Ohio
 Selmer, W. L....New York City
 Serber, D. C.....New York City
 Shailer, R. A....Brookline, Mass.
 Shaw, G. H....Washington, D. C.
 Sheridan, L. V....New York City
 Sherman, C. W....Boston, Mass.
 Sherrerd, M. R....Newark, N. J.
 Sherron, G. A....Norwalk, Conn.
 Shertzer, T. B....New York City
 Shuman, L. D....Philadelphia, Pa.
 Shute, J. S.....New York City
 Sikes, Z. H.....Yonkers, N. Y.
 Simpson, J. T....Newark, N. J.
 Skillin, E. S....Glen Ridge, N. J.
 Skinner, B. B....Brooklyn, N. Y.
 Skinner, F. W.,
 Tompkinsville, N. Y.
 Skinner, J. F....Rochester, N. Y.
 Sloan, S. A....Philadelphia, Pa.
 Small, J. H., Jr. Rutherford, N. J.
 Smith, A. O. .Port Jefferson, N. Y.
 Smith, C. W....Westwood, N. J.
 Smith, E. F.....Brooklyn, N. Y.
 Smith, E. N.....Nutley, N. J.
 Smith, G. W.,
 Montreal, Que., Canada
 Smith, H. S....Wilkes-Barre, Pa.
- Smith, J. W.....New York City
 Smith, W. F.....Valhalla, N. Y.
 Smoley, C. K.....Scranton, Pa.
 Smoyer, L. I.....New York City
 Snell, T. C. B.....Newark, N. J.
 Snow, C. H.....New York City
 Snow, J. B....Woodhaven, N. Y.
 Snyder, G. D....New York City
 Soest, H. C.....New York City
 Solomon, G. R.....Atlanta, Ga.
 Sonne, Otto.....New York City
 Soper, G. A.....New York City
 Spaulding, F. A. .Pittsfield, Mass.
 Spear, P. H.,
 Hastings-on-Hudson, N. Y.
 Spear, W. E.....New York City
 Spencer, C. B....New York City
 Spencer, Herbert. .New York City
 Spencer, T. N.,
 West Philadelphia, Pa.
 Splitstone, C. H. .New York City
 Sprague, E. L., Jr.,
 White Plains, N. Y.
 Stanton, W. D....Cohocton, N. Y.
 Stark, C. W.....New York City
 Starkweather, A. K. .Nutley, N. J.
 Starr, H. H.....New York City
 Stearns, F. P.....Boston, Mass.
 Stearns, R. H.....Boston, Mass.
 Stehle, F. C. South Bethlehem, Pa.
 Steinman, D. B. .New York City
 Stengel, C. H....New York City
 Stephens, A. W..New York City
 Stern, E. W.....New York City
 Stevens, J. F....New York City
 Stevenson, W. F.,
 New Rochelle, N. Y.
 Stiles, A. I.....New York City
 Stoddard, G. C. .New York City
 Stone, W. W....Watertown, N. Y.
 Storey, F. S.....New York City
 Stowe, H. C.....Brooklyn, N. Y.
 Stowitts, G. P....Yonkers, N. Y.
 Strachan, Joseph. .Brooklyn, N. Y.

Strachan, R. C., Richmond Hill, N. Y.	Tolles, F. C.....Cincinnati, Ohio
Strawn, T. C.....New York City	Tompkins, E. DeV..New York City
Strobel, C. L.....Chicago, Ill.	Tooker, F. W...East Orange, N. J.
Strong, J. B.....Hillburn, N. Y.	Torrey, J. E.....Paterson, N. J.
Strong, M. R.....New York City	Tower, J. W.....New York City
Stuart, J. C. K., Montreal, Que., Canada	Tozzler, A. C.....New York City
Sutton, C. W.....Chester, Pa.	Trautwine, J. C., Jr., Philadelphia, Pa.
Sutton, Frank..Washington, D. C.	Travell, W. B...Ridgewood, N. J.
Swain, G. F.....Boston, Mass.	Travers-Ewell, A..New York City
Sweeney, H. C....Brooklyn, N. Y.	Tretter, G. A.....Roanoke, Va.
Sweetland, H. A..Hartford, Conn.	Tribus, L. L.....New York City
Swensson, O. J....Yonkers, N. Y.	Triest, W. G.....New York City
Swift, W. E.....Hartsdale, N. Y.	Trout, C. E.....New York City
Swindells, J. S...Brooklyn, N. Y.	Trow, F. H..Brown Station, N. Y.
	Trowbridge, D. S..New York City
	Tucker, L. W.....New York City
	Tull, R. W.....New York City
Taber, G. A.....Brooklyn, N. Y.	Turner, D. L.....New York City
Taft, J. R.....New York City	Turner, E. K.....Boston, Mass.
Talbot, A. N.....Urbana, Ill.	Turner, H. C.....New York City
Talbot, Earle.....Utica, N. Y.	Turner, J. P...Amsterdam, N. Y.
Talbot, F. M.....New York City	Tuska, G. R.....New York City
Tallman, Leroy...Newark, N. J.	Tuttle, A. S.....New York City
Tallman, P. B..East Orange, N. J.	
Taylor, C. F.....New York City	Underhill, G. G....Newark, N. J.
Tenney, G. O.....Richmond, Va.	Ungrich, M. J.....New York City
Thayer, N. A.....New York City	Upson, M. M.....New York City
Thomas, C. D....Brooklyn, N. Y.	Upton, Joseph....Flushing, N. Y.
Thomas, W. J.....New York City	
Thomes, E. H....Jamaica, N. Y.	Vail, E. M.....Plainfield, N. J.
Thompson, J. A..New York City	Vallely, W. P.....New York City
Thompson, S. C...New York City	Van Cleve, A. H..New York City
Thompson, S. E., Newton Highlands, Mass.	Van Horne, J. G..New York City
Thomson, S. F....Brooklyn, N. Y.	Van Keuren, C. A., Jersey City, N. J.
Thomson, T. K....New York City	Van Norden, E. M.Brooklyn, N. Y.
Thorndike, S. H....Boston, Mass.	Van Petten, A. A., Bayamon, Porto Rico
Throop, G. H..Mamaroneck, N. Y.	Verveer, E. L....New York City
Thurber, C. D....Brooklyn, N. Y.	Vincent, E. F.....Denver, Colo.
Tidd, A. W..White Plains, N. Y.	Vincent, J. I.....New York City
Tighe, J. L.....Holyoke, Mass.	Vredenburgh, Watson, Jr., Woodmere, N. Y.
Tilden, C. J.....Baltimore, Md.	
Timberlake, S. M., East Orange, N. J.	

- Waddell, F. C.,
 West New Brighton, N. Y.
 Waddell, J. A. L. Kansas City, Mo.
 Wadsworth, G. R. Brookline, Mass.
 Wadsworth, J. E. New York City
 Wagner, B. M.,
 Rockville Center, N. Y.
 Wagner, J. C. Philadelphia, Pa.
 Wait, B. H. White Plains, N. Y.
 Walker, C. I. New York City
 Walker, J. J. Dobbs Ferry, N. Y.
 Waller, Percy. Rochester, N. Y.
 Ward, C. D. New York City
 Ward, H. M. Bloomfield, N. J.
 Warnock, W. H. New York City
 Wasser, T. J. Jersey City, N. J.
 Watkins, F. W.,
 White Plains, N. Y.
 Watters, G. L.,
 South Bethlehem, Pa.
 Webster, G. S. Philadelphia, Pa.
 Webster, M. A. Frankford, Pa.
 Wegmann, Edward. Yonkers, N. Y.
 Weitzner, H. M. New York City
 Wells, C. E. Yonkers, N. Y.
 Wells, G. E. Naugatuck, Conn.
 Welty, H. T. Yonkers, N. Y.
 Werbin, I. V. New York City
 Weymouth, Aubrey. Flushing, N. Y.
 Wheatcroft, H. B. Newark, N. J.
 Wheeler, W. S. Lima, Peru
 Wheelock, De F. A. Warren, Pa.
 Whinery, Samuel,
 East Orange, N. J.
 Whiskeman, J. P. New York City
 White, Lazarus. New York City
 Whitney, C. S. Ithaca, N. Y.
 Whitney, F. O. Boston, Mass.
 Whitney, G. C. New York City
 Whitson, A. U. Flushing, N. Y.
 Whittmore, W. F. Hoboken, N. J.
 Whittier, T. T. New York City
 Wickham, H. R. Brooklyn, N. Y.
 Wiggin, E. W. New Haven, Conn.
 Wiggin, T. H. Scarsdale, N. Y.
 Wilcock, Frederick,
 Brooklyn, N. Y.
 Wiley, W. H. New York City
 Williams, G. S. Ann Arbor, Mich.
 Williams, J. P. J.,
 Chautauqua, N. Y.
 Willoughby, J. E.,
 Wilmington, N. C.
 Wilmot, James. New York City
 Wilmot, Sydney. New York City
 Wilson, C. A. Cincinnati, Ohio
 Wilson, C. W. S.,
 New Rochelle, N. Y.
 Wilson, H. Z. New York City
 Wilson, T. L. New York City
 Wilson, T. W. Wilmington, Del.
 Wilson, William. New York City
 Wilson, W. T. New York City
 Winsor, F. E. White Plains, N. Y.
 Winsor, G. A. Valhalla, N. Y.
 Wise, C. R. Passaic, N. J.
 Wise, R. S. Passaic, N. J.
 Witmer, F. P. East Orange, N. J.
 Woehrlin, G. J. Brooklyn, N. Y.
 Wolff, A. D., Jr.,
 White Plains, N. Y.
 Wood, G. P. Peekskill, N. Y.
 Woodruff, G. B.,
 South Bethlehem, Pa.
 Wyckoff, C. R. Hartsdale, N. Y.
 Wyman, A. M.,
 Long Island City, N. Y.
 Yappan, Adolph. Chicago, Ill.
 Yates, B. C. Lead, S. Dak.
 Yates, E. A. New York City
 Yates, P. K. New York City
 Yates, W. H. Albany, N. Y.
 Yereance, W. B. New York City

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

March 3d, 1915.—8.30 P. M.—This will be a regular business meeting. A paper by Harold Perrine and George H. Strehan, Juniors, Am. Soc. C. E., entitled "Cinder Concrete Floor Construction Between Steel Beams", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

March 17th, 1915.—No paper is scheduled for this meeting, but a programme will be arranged and announced later.

ANNUAL CONVENTION

The Annual Convention of the Society will be held in San Francisco, Cal., September 16th, 17th, and 18th, 1915, being the Thursday, Friday, and Saturday immediately preceding the International Engineering Congress, which is to be held during the week beginning September 20th.

Three of the other National Engineering Societies, under whose auspices the International Engineering Congress is to be held, will also hold meetings in San Francisco at about that time.

Arrangements will be made for a special train, and possibly more than one train, to accommodate the members of all of these Societies who wish to attend their own meeting as well as the Congress.

This matter is in the hands of a Joint Committee of representatives of these organizations, and it is expected that within a short time a circular will be mailed to the entire membership of these Societies (some 28 000), giving in detail a schedule of train service, railroad and hotel rates, etc.

THE ENGINEERING FOUNDATION

On Wednesday, January 27th, 1915, at 8.30 P. M., a meeting to inaugurate the Engineering Foundation was held in the Auditorium of the United Engineering Societies Building, 29 West 39th Street, New York City, at which there was a large attendance. Mr. Gano Dunn, President of the United Engineering Society and Past-President of the American Institute of Electrical Engineers, presided, and announced that the Engineering Foundation had been started by a gift of \$200 000 from Mr. Ambrose Swasey, of Cleveland, Ohio. Addresses were made by Dr. Henry Pritchett, President of the Carnegie Foundation for the Advancement of Teaching; Dr. Robert W. Hunt, Past-President of the American Institute of Mining Engineers; Mr. Charles Macdonald, Past-President of the American Society of Civil En-

gineers; and Dr. Alexander C. Humphreys, Past-President of the American Society of Mechanical Engineers.

Under this Foundation, as announced previously, this fund is to be administered by a Board consisting of two representatives from each of the four National Engineering Societies, the President of the United Engineering Society, *ex officio*, and two members to be elected at large.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In making a search it sometimes happens that references are found which are not readily accessible to the person for whom the search is made. In that case the material may be reproduced by photography, and this can be done for members at the cost of the work to the Society, which is small. This method is particularly useful when there are drawings or figures in the text, which would be very expensive to reproduce by hand.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M., every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Roger W. Toll, 700 Tramway Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 P. M., at the Albany Hotel.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

January 9th, 1915.—The meeting was held at the Albany Hotel; President Vincent in the chair; J. Y. Jewett, Vice-President, acting as Secretary; and present, also, 32 members and guests.

The minutes of the December, 1914, meeting were read and approved.

President Vincent announced that he would attend the meeting of the Presidents of the Local Associations to be held in New York City on January 19th, 1915.

On motion, duly seconded, a Committee on Legislation to represent the interests of the Association at the present session of the Colorado Legislature was appointed by the President, as follows: G. G. Anderson, Chairman, C. W. Comstock, J. E. Field, H. S. Crocker, and G. N. Houston.

On motion, duly seconded, a Committee to draft a bill on the Licensing of Civil Engineers for presentation to the Legislature, was appointed as follows: M. S. Ketchum, Chairman, J. E. Field, and Arthur Ridgway.

On motion, duly seconded, it was decided to call a special meeting of the Association for the discussion of the subject of licensing civil engineers, after the return of President Vincent from the New York meeting, and as a guide for the President, in discussing the subject before that meeting, a vote of the members present was taken with the following result: In favor, 10; against, 4; non-committal, 5; the remainder not voting.

A paper, on Unit Construction of Concrete Structures and a New Method of Placing Concrete Linings in Tunnels by Compressed Air, was presented by Mr. Shirley Houghton, assisted by Mr. C. S. Bumann, and illustrated with lantern slides. On account of the lateness of the hour, the paper was not discussed.

A vote of thanks was tendered Messrs. Houghton and Bumann for their interesting paper.

Adjourned.

Atlanta Association

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club, Atlanta, Ga.

(Abstract of Minutes of Meeting)

January 9th, 1915.—B. M. Hall in the chair; Thomas P. Branch, Secretary; and present, also, 6 members.

The minutes of the last meeting were read and approved.

The report of the Committee on the Revision of the Constitution was read by sections, amended, and adopted.

The report of the Committee on the Nominations of Officers was read and adopted, the following officers being elected: President, Park A. Dallis; First Vice-President, B. M. Hall; Second Vice-President, P. H. Norcross; Secretary-Treasurer, T. P. Branch.

The Chairman addressed the meeting in regard to the recognition of Juniors in some manner other than the mere printing of their names as such.

On motion, duly seconded, it was decided that the Association urge upon the Society: First, the institution of a student grade; second, some recognition of Juniors; and third, that the representative of the Association to the meeting of the Presidents of the Local Associations to be held in New York City on January 19th, 1915, be instructed to bring these matters before that meeting.

Adjourned.

Baltimore Association

On May 6th, 1914, the Baltimore Association of Members of the American Society of Civil Engineers was organized, a Constitution adopted, and the following officers were elected: J. E. Greiner, President; Francis Lee Stuart, First Vice-President; L. H. Beach, Second Vice-President; Harry D. Williar, Jr., Secretary-Treasurer; and Messrs. H. D. Bush, B. T. Fendall, B. P. Harrison, Calvin W. Hendrick, Oscar F. Lackey, M. A. Long, and A. A. Thompson, Directors.

At its meeting of September 2d, 1914, the Board of Direction considered and approved the proposed Constitution of the Baltimore Association of Members of the American Society of Civil Engineers.

Cleveland Association

At its meeting of January 6th, 1915, the Board of Direction considered and approved the proposed Constitution of the Cleveland Association of Members of the American Society of Civil Engineers.

The following officers have been elected: President, Willard Beahan; Vice-President, Robert Hoffmann; Secretary-Treasurer, George H. Tinker.

Louisiana Association

The Louisiana Association of Members of the American Society of Civil Engineers (New Orleans, La.) has been organized with the following officers: Frank M. Kerr, President; J. F. Coleman, and W. B. Gregory, Vice-Presidents; A. M. N. Blamphin, Treasurer; and L. C. Datz, Secretary.

Northwestern Association

At its meeting of November 4th, 1914, the Board of Direction considered and approved the proposed Constitution of the Northwestern Association of Members of the American Society of Civil Engineers (St. Paul and Minneapolis, Minn.). F. W. Cappelen is President and R. D. Thomas, Secretary.

Philadelphia Association

The meetings of the Association are held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

At the meeting of the Association on October 5th, 1914, the following officers were elected for the ensuing year: President, Richard L. Humphrey; Vice-Presidents, F. Herbert Snow and William Hunter;

Directors, John Sterling Deans, John W. Ledoux, Edgar Marburg, and H. S. Smith; Treasurer, S. M. Swaab; and Secretary, W. L. Stevenson.

(Abstract of Minutes of Meeting)

January 18th, 1915.—The meeting was called to order; President Richard L. Humphrey in the chair; W. L. Stevenson, Secretary; and present, also, 127 members and guests.

Mr. Edgar Marburg made a report on the activities of the Committee on Licensing Engineers. On motion, it was decided to recommend the appointment of a committee of the Society to investigate the subject of the licensing of engineers if the matter was not considered at the meeting of the Presidents of the Local Associations.

Letters by Messrs. Richard L. Humphrey and Charles Warren Hunt, relative to calling a meeting of the Presidents of the Local Associations, or their representatives, were read.

Mr. John Sterling Deans presented the resolution passed by the Board of Direction of the Association, relative to an Amendment to Article IV of its Constitution, providing that a certain number of Past-Presidents should be members of the Board, which was approved by the meeting.

President Humphrey announced some changes in the proposed charter of the "Engineers' Society of Philadelphia", and stated that the matter would be submitted in final form at the April meeting of the Association.

A letter from Mr. Charles Warren Hunt, Secretary of the Society, asking for suggestions as to the place of meeting of the Society, was read, and, on motion, the matter was referred to President Humphrey without instructions.

Charles D. Marx, President, Am. Soc. C. E., addressed the meeting on the Panama-Pacific Exposition and the Engineering Congress of 1915, and was tendered a rising vote of thanks for honoring the Association by being its guest and for his interesting address.

Adjourned.

Portland, Ore., Association

At the meeting of the Association on October 21st, 1914, the following officers were elected for the ensuing year: President, George C. Mason; First Vice-President, W. S. Turner; Second Vice-President, John T. Whistler; Treasurer, G. B. Hegardt; and Secretary, Charles J. McGonigle.

(Abstract of Minutes of Meeting)

January 8th, 1915.—The meeting was held at the Commercial Club; President Mason in the chair; Charles J. McGonigle, Secretary.

The meeting was held to discuss legislative matters of interest to engineers. The various laws affecting engineers and their work in Oregon were discussed by Messrs. Lewis, Mason, Newell, and others. On motion, duly seconded, it was decided that the Association go on record as opposed to a tax on water power.

It was moved, seconded, and carried that the Association favor placing under the office of the State Engineer, the investigation and ex-

plottation of natural resources and the administration of all work of an engineering nature handled by the State.

On motion, duly seconded, it was decided that the Association request the United States Geological Survey to extend the topographical and river profile surveys of Snake River to Lewiston, Idaho.

On motion, duly seconded, it was ordered that the Legislative Committee consider the matter of the authority of City Engineers of cities in Oregon in laying out plats within 1 mile outside the city limits.

Adjourned.

St. Louis Association

At its meeting of October 7th, 1914, the Board of Direction considered and approved the proposed Constitution of the St. Louis Association of Members of the American Society of Civil Engineers.

The following officers have been elected: President, J. A. Ockerson; First Vice-President, Edward E. Wall; Second Vice-President, F. J. Jonah; Secretary-Treasurer, Gurdon G. Black. The meetings of the Association are held at the Engineers' Club Auditorium.

Seattle Association

(Abstract of Minutes of Meeting)

January 25th, 1915.—The Annual Meeting was called to order at 7.15 p. m.; President Ernest B. Hussey in the chair; Carl H. Reeves, Secretary; and present, also, 47 members and guests.

The President presented the guest of honor, the Rev. M. A. Matthews, who addressed the meeting, his subject being "Efficiency".

Mr. J. C. Ralston outlined the plan of the proposed Affiliated Engineering Society of Spokane and invited the members of the Association to attend the Third Annual Convention of that Society to be held in Spokane, on February 23d-25th, 1915.

President Hussey briefly outlined the work of the Association during 1914, and presented the report of Mr. John L. Hall, the representative from the Association at the meeting of the Presidents of the Local Associations, held in New York City on January 19th, 1915.

A unanimous vote of thanks was tendered Dr. Matthews for his helpful and instructive address.

The minutes of the meeting of December 28th, 1914, were read and approved.

The report of the Secretary-Treasurer for 1914 was presented and adopted.

The President read a letter from Charles Warren Hunt, Secretary of the Society, relative to holding a Spring meeting of the Society outside of New York City. On motion, duly seconded, the Association concurred in the plan for holding such meeting.

The officers for 1915 were nominated and elected, as follows: President, R. H. Ober; Vice-President, A. S. Downey; Secretary-Treasurer, Carl H. Reeves.

In reference to Mr. Hall's report of the meeting of the Presidents of the Local Associations, Mr. S. H. Hedges stated that, in his opinion, the Presidents of the proposed districts should be the Directors from those districts.

On motion, duly seconded, copies of Mr. Hall's report were ordered sent to the members of the Association, with the request that they make comments or offer suggestions for possible changes in the plan as outlined by the Majority Report of the Conference.

On motion, duly seconded, the Secretary-Treasurer was ordered to prepare a roster of the Association for 1915, and mail a copy to each member.

On motion, duly seconded, a vote of thanks was extended to the retiring officers in appreciation of the excellent work done by them.

Mr. Charles Evan Fowler addressed the meeting briefly on the duties and opportunities of engineers in assuming their share of work in public affairs.

Mr. Robert Howes, Chairman of the Conference Committee announced a meeting of the Joint Committee on the Federation of Technical Societies, to be held on January 27th, 1915.

Adjourned.

Southern California Association

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular bi-monthly meetings, with banquet, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 p. m. every Wednesday, and the place of meeting may be ascertained from the Secretary of the Association, W. K. Barnard, 515 Central Building, Los Angeles, Cal.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

Spokane Association

At its meeting of March 4th, 1914, the Board of Direction considered and approved the proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers. Ulysses B. Hough is President.

Texas Association

At its meeting of December 31st, 1913, the Board of Direction considered and approved the proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers. The headquarters of the Association is Dallas, Tex. John B. Hawley is President.

MINUTES OF MEETINGS OF SPECIAL COMMITTEES TO REPORT UPON ENGINEERING SUBJECTS

Special Committee on Stresses in Railroad Track

March 18th, 1914.—The meeting was held in Chicago, Ill. Present, A. N. Talbot (Chairman), A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W.

G. Cushing, Emil Gerber, William McNab, G. J. Ray, F. E. Turneaure, and J. E. Willoughby.

The Committee met in joint session with the Committee on Stresses in Railroad Track of the American Railway Engineering Association, the two committees having decided to co-operate in the work. Of the Committee of the American Railway Engineering Association there were present W. M. Dawley, P. H. Dudley, H. E. Hale, J. B. Jenkins, and Paul M. LaBach.

There was a general discussion on the field of work and the way in which the work should be undertaken. Letters from men having special instruments and equipment for measuring deformations were read. A sub-committee consisting of A. N. Talbot, A. S. Baldwin, John Brunner, F. E. Turneaure, and W. M. Dawley was appointed to report on methods of organization and scope of work.

June 3d, 1914.—The meeting was held in Baltimore, Md. Present, A. N. Talbot (Chairman), John Brunner, Charles S. Churchill, C. G. E. Larsson, G. J. Ray, and J. E. Willoughby, of the Committee, and W. M. Dawley, P. H. Dudley, J. B. Jenkins, and Albert Reichmann. The report of the sub-committee on Methods of Organization and Scope of Work was discussed and adopted.

The following sub-committees were appointed:

Executive.—A. S. Baldwin, John Brunner, Charles S. Churchill, W. M. Dawley, and A. N. Talbot.

Tests.—John Brunner, W. J. Burton, W. M. Dawley, P. H. Dudley, H. E. Hale, J. B. Jenkins, Paul M. LaBach, C. G. E. Larsson, Albert Reichmann, A. N. Talbot, F. E. Turneaure, and J. E. Willoughby.

Ways and Means.—A. S. Baldwin, Charles S. Churchill, W. G. Cushing, W. M. Dawley, Robert W. Hunt, George W. Kittredge, William McNab, G. J. Ray, and Earl Stimson.

E. H. Fritch was chosen as Secretary of the Committee.

The programme of tests was left to the sub-committee on Tests, though the general idea was expressed that the first work should include the development of instruments and apparatus, and preliminary work on track, and that the latter should include the determination of the equilibrium depression curve of track as found statically with different weights of rail and different conditions of track, ballast, and roadbed. It was also decided that tests should be made on ballast and roadbed materials.

The general plan of carrying on the work was left to the Executive Committee, as was the matter of the budget and expenditures, and that Committee was asked to act as a financial committee. Other matters relating to the work of the Committee were discussed.

Special Committee on A National Water Law

January 20th, 1915.—The first regular meeting of the Committee was held at the House of the Society. Present, F. H. Newell (Chairman), Clemens Herschel, Robert E. Horton, Charles D. Marx, and Gardner S. Williams. The Chairman recited the various efforts made to hold a meeting of the Committee since its formation (June

4th, 1913), namely, at the last Annual Meeting, January 21st, 1914, and in Denver on April 9th, 1914. Not being able to meet a majority of the members at any one time, the Chairman had consulted individual members personally and by correspondence. As a result there had been prepared and mailed to each member of the Society a circular letter, dated June 30th, 1914, asking the co-operation of the members and for information. The replies received indicated general interest in the subject and also the fact that investments aggregating many millions of dollars are being delayed because of uncertainties growing out of lack of adequate State and National water laws; also that the fullest use and enjoyment of many natural resources are rendered impracticable by existing conditions which might be remedied through well-conceived legislation.

The conclusion reached was that the first part of the Resolution of June 4th, 1913, had been fulfilled, namely, that the Special Committee had investigated "the advisability of drafting a National Water Law applicable to all navigable, interstate and other waters within the jurisdiction of the United States, and embracing all uses of water," and that now the Committee deemed it advisable to enter upon the second part of the work authorized by the Resolution, namely, "to prepare a preliminary draft of such a law for submission at some regular meeting of the Society."

Inasmuch as the Committee approaches the subject from the standpoint of engineers rather than that of professional law makers, it was agreed that, before attempting to prepare a preliminary draft of a law, there should be agreement, as far as possible:

First, on the facts which necessitate such a law;

Second, on the principles which should underlie such a proposed law; and

Third, on the extent to which such principles may be embodied in a law.

Correspondence and replies to the circular letter have brought together many of the facts, but, in order that these may be more complete, it was agreed that additional correspondence should be entered into.

It was also understood that the individual members of the Committee should make suggestions as to the principles which should underlie such proposed law, and discuss, in sub-committees or otherwise, the more important of them.

The selection of a Secretary was deferred, the Chairman acting as such until more definite action could be taken.

PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

**American Institute of Mining Engineers, 29 West Thirty-ninth Street,
New York City.**

- American Society of Mechanical Engineers**, 29 West Thirty-ninth Street, New York City.
- Architekten-Verein zu Berlin**, Wilhelmstrasse 92, Berlin W. 66, Germany.
- Associação dos Engenheiros Cívis Portuguezes**, Lisbon, Portugal.
- Australasian Institute of Mining Engineers**, Melbourne, Victoria, Australia.
- Boston Society of Civil Engineers**, 715 Tremont Temple, Boston-Mass.
- Brooklyn Engineers' Club**, 117 Remsen Street, Brooklyn, N. Y.
- Canadian Society of Civil Engineers**, 413 Dorchester Street, West, Montreal, Que., Canada.
- Civil Engineers' Society of St. Paul**, St. Paul, Minn.
- Cleveland Engineering Society**, Chamber of Commerce Building, Cleveland, Ohio.
- Cleveland Institute of Engineers**, Middlesbrough, England.
- Dansk Ingeniørforening**, Amaliegade 38, Copenhagen, Denmark.
- Detroit Engineering Society**, 46 Grand River Avenue, West, Detroit, Mich.
- Engineers and Architects Club of Louisville**, 1412 Starks Building, Louisville, Ky.
- Engineers' Club of Baltimore**, Baltimore, Md.
- Engineers' Club of Minneapolis**, 17 South Sixth Street, Minneapolis, Minn.
- Engineers' Club of Philadelphia**, 1317 Spruce Street, Philadelphia, Pa.
- Engineers' Club of St. Louis**, 3817 Olive Street, St. Louis, Mo.
- Engineers' Club of Toronto**, 96 King Street, West, Toronto, Ont., Canada.
- Engineers' Society of Northeastern Pennsylvania**, 415 Washington Avenue, Scranton, Pa.
- Engineers' Society of Pennsylvania**, 31 South Front Street, Harrisburg, Pa.
- Engineers' Society of Western Pennsylvania**, 2511 Oliver Building, Pittsburgh, Pa.
- Institute of Marine Engineers**, 58 Romford Road, Stratford, London, E., England.
- Institution of Engineers of the River Plate**, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.
- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.
- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.

Louisiana Engineering Society, State Museum Building, Chartres and St. Ann Streets, New Orleans, La.

Memphis Engineering Society, Memphis, Tenn.

Midland Institute of Mining, Civil and Mechanical Engineers, Sheffield, England.

Montana Society of Engineers, Butte, Mont.

North of England Institute of Mining and Mechanical Engineers, Newcastle-upon-Tyne, England.

Oesterreichischer Ingenieur- und Architekten-Verein, Eschenbachgasse 9, Vienna, Austria.

Oregon Society of Civil Engineers, Portland, Ore.

Pacific Northwest Society of Engineers, 803 Central Building, Seattle, Wash.

Rochester Engineering Society, Rochester, N. Y.

Sachsischer Ingenieur- und Architekten-Verein, Dresden, Germany.

Sociedad Colombiana de Ingenieros, Bogota, Colombia.

Sociedad de Ingenieros del Peru, Lima, Peru.

Societe des Ingenieurs Civils de France, 19 rue Blanche, Paris, France.

Society of Engineers, 17 Victoria Street, Westminster, S. W., London, England.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18-1, Copenhagen, Denmark.

Western Society of Engineers, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From January 4th to February 1st, 1915)

DONATIONS***AMERICAN SEWERAGE PRACTICE:**

Volume II, Construction of Sewers. By Leonard Metcalf and Harrison P. Eddy, Members, Am. Soc. C. E. Cloth, 9½ x 6¼, illus., 10 + 564 pp. New York and London, McGraw-Hill Book Company, Inc., 1915. \$4.00.

The first volume of this series on American Sewerage Practice was devoted to the Design of Sewers. In this, the second volume, the authors have taken up and described in detail the Construction of Sewers. Because such construction, to be of value, involves attention to many apparently unimportant details, the authors, it is stated, have discussed many things, in this volume, which usually are barely touched on in books and papers on sewerage. After giving in detail, for the student and engineer, the preliminary steps in sewer construction, such as maps, field work, examination of soil, borings, estimates, records, etc., the authors describe methods, machinery, and costs for excavation and tunneling, the purchasing, handling, and laying of various kinds of sewers, the contracts, specifications, and drawings for sewer work, and the operation and maintenance of sewers, as well as the causes and methods of prevention of explosions in sewers. The authors have had experience, it is stated, as designing and supervising engineers, not only on contract work, but also with day labor, of many miles of sewers, and they have endeavored in this book to present the instructions they would issue to superintendents and foremen in charge of such work and the advice they would give to contractors taking up sewer construction for the first time. It is hoped that the volume will prove useful to these men as well as to engineers and inspectors who should be familiar with practical methods of sewer construction. The Chapter headings are: Preliminary Investigations; Engineering Work and Inspection During Construction; Excavation; Machinery for Trench Excavation; Methods of Rock Excavation; Explosives and Blasting; Quantity and Cost of Excavation; Rate of Progress in Building Sewers; The Sheet piling and Bracing of Trenches and Tunnels; Sizes of Sheet piling, Ranges and Braces; Purchasing, Handling and Laying Sewer Pipe; Jointing Sewer Pipe; Construction of Brick and Block Sewers; Construction of Concrete Sewers; Profiles, Templates, Forms and Centers; Contracts, Specifications and Drawings; Technical Specifications; Operations and Maintenance of Sewerage Systems; Explosions in Sewers; Index.

MECHANISM OF STEAM ENGINES.

By Walter H. James and Myron W. Dole. Cloth, 9¼ x 6 in., illus., 10 + 170 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1914. \$2.00.

The purpose of the authors, in this book, has been, it is stated, to present the subject in a manner that will make clear to the beginner the mechanical principles on which the steam engine operates, with special reference to the valve gear and governing devices, and the various diagrams used in the study of the engine. The book, it is stated, is intended as an elementary treatise on the kinematics of reciprocating engines and steam turbines, and is planned to meet primarily the needs of students who take up this subject as a part of, or immediately following, their course in the elements of mechanism and before they take up the study of the theory and practice of heat engineering or machine design. In order to illustrate the principles and methods described and to make them clearly understood, the authors have included examples, as well as detailed explanations, of the different types of mechanisms described. The Contents are: Introduction; General Discussion of a Reciprocating Steam Engine; Single-Valve Engines; Valve Diagrams; Typical Problems on the Slide-Valve Engine; Governing Devices for Single-Valve Engines; Riding Cut-Off Valves and Their Governing Devices; Multiple-Valve Engines; Hand-Operated Reversing and Controlling Gears; Valve Setting; Steam Turbines; Turbine Valve Mechanisms and Governors; Index.

*Unless otherwise specified, books in this list have been donated by the publishers.

USE OF WATER IN IRRIGATION.

By Samuel Fortier. (Agricultural Engineering Series.) Cloth, 8½ x 5½ in., illus., 13 + 265 pp. New York and London, McGraw-Hill Book Company, Inc., 1915. \$2.00.

This book, the author states, records mainly experiences in irrigation and irrigation methods gained in the field and laboratory. As here presented the subject-matter is said to deal with the agricultural side of irrigation, and the author's aim has been to benefit three classes of readers: the new settlers and those who are contemplating homes in the West; irrigation farmers and those interested in irrigation; and students in agricultural and engineering classes in high schools, colleges, and universities. The subject-matter, it is stated, deals almost exclusively with the irrigated farm and to problems that confront the irrigator, the legal, economic, and engineering phases being touched on only as they affect the welfare of the farmer. The author has described in detail methods of preparing the land, applying the water, and maintaining moisture conditions in the soil, and hopes that out of the methods described the farmer may adopt those best suited to his farm and thus pave the way for profitable returns. The Contents are: Introduction; The Irrigated Farm; The Necessary Equipment and Structures; Methods of Preparing Land and Applying Water; Waste, Measurement, Delivery and Duty of Water; Irrigation of Staple Crops; Index.

CONSTRUCTION OF MASONRY DAMS.

By Chester W. Smith, Assoc. M. Am. Soc. C. E. Cloth, 9½ x 6½ in., illus., 11 + 279 pp. New York and London, McGraw-Hill Book Company, Inc., 1915. \$3.00.

The preface states that this book has been written from the viewpoint of the constructing engineer, and the author hopes that it will supply details of construction and supervision which heretofore have not been adequately covered in treatises on this subject. As it has not been possible in a volume of this size to cover the whole subject of dams and dam construction, the author states that earthwork, rock excavation, pumping, cement, and source and distribution of power, have been omitted or are only touched on in the most elementary manner. In Chapter XIV is described the estimating of costs, and cost figures are given which it is hoped will prove reliable and useful guides for construction estimates. There is also included a partial list of existing dams with descriptions and costs. The Contents are: Exploring the Site; Temporary Works for Stream Diversion; Preparing the Foundation; Masonry Construction; Quarrying; Face Work; Miscellaneous Features; Plant and Power; Installation Required and Power Consumption; Assembling Materials, Crushing and Mixing; Transportation of Materials; Probable Future Methods; Estimates of Cost; Partial List of Existing Dams with Description and Costs; Index.

Gifts have also been received from the following:

- | | |
|--|---|
| Abbott, Hunley. 1 pam. | Canadian Northern Ry. Co. 1 pam. |
| Akron, Ohio-Bldg. Dept. 1 pam. | Case School of Applied Science. 1 vol. |
| Allentown, Pa.-Bldg. Insp. 1 pam. | Cedar Rapids, Iowa-City Clerk. 1 bound |
| Altoona, Pa.-City Clerk. 1 pam. | vol., 1 pam. |
| Am. Gas Inst. 1 pam. | Century Assoc. 1 bound vol. |
| Am. Inst. of Elec. Engrs. 2 bound vol. | Chicago, Ill.-Municipal Reference Li- |
| Am. Ry. Master Mechanics Assoc. 2 | brary. 3 pam. |
| bound vol. | Chicago & Alton R. R. Co. 7 pam. |
| Am. Soc. of Heating and Ventilating | Chicago San. Dist. 1 bound vol. |
| Engrs. 2 bound vol. | Cincinnati, Univ. of. 1 vol. |
| Am. Telephone & Telegraph Co. 1 pam. | Colorado-State Agri. Coll. 1 pam. |
| Armour Inst. of Tech. 1 vol. | Colorado School of Mines. 1 pam. |
| Baltimore, Md.-Water Board. 1 vol. | Colorado, Univ. of. 1 pam. |
| Bay City, Mich.-City Clerk. 1 bound | Covington, Ky.-Bldg. Insp. 1 pam. |
| vol. | Dallas, Tex.-Bldg. Insp. 1 bound vol. |
| Bemis, Edward W. 2 pam. | Dartmouth Coll. 1 vol. |
| Breithaupt, W. H. 1 bound vol. | Delaware, Lackawanna & Western R. R. |
| Buffalo, N. Y.-Bureau of Water. 1 vol. | Co. 5 pam. |
| Buffalo, N. Y.-Dept. of Public Works. | Detroit, Mich.-Board of Water Commrs. |
| 1 vol. | 1 pam. |
| Bureau of Ry. Economics. 3 pam. | Dubuque, Iowa-City Council. 1 bound |
| California, Univ. of. 1 vol. | vol. |
| Canada-Dept. of Marine and Fisheries. | East Indian Ry. Co. 1 pam. |
| 1 vol., 1 pam. | Elgin, Ill.-City Clerk. 1 bound vol. |
| Canada-Water Power Branch. 4 vol., | Everett, Mass.-City Clerk. 1 bound vol. |
| maps. | Fall River, Mass.-City Clerk. 1 pam. |

- Florida-State Geol. Survey. 1 bound vol.
 Fort Worth, Tex.-City Secy. 1 pam.
 Fowler, Charles Evan. 1 bound vol.
 French, Alexis H. 3 bound vol.
 General Education Board. 1 bound vol.
 Green Bay, Wis.-City Clerk. 1 vol.
 Hartford, Conn.-City Engr. 1 pam.
 Harvard Univ. 1 vol.
 Hawaii-Board of Health. 1 pam.
 Henry, Philip W. 1 pam.
 Himmelwright, A. L. A. 1 pam.
 Holyoke, Mass.-City Engr. 1 pam.
 Illinois-Public Utilities Comm. 11 pam.
 Illinois-State Geol. Survey. 1 bound vol.
 Indiana-Dept. of Oil Inspection. 1 pam.
 Indiana, Univ. of. 1 pam.
 Iowa-Board of R. R. Commrs. 1 bound vol.
 Jersey City, N. J.-Supt. of Bldgs. 1 bound vol.
 Kalamazoo, Mich.-Bldg. Insp. 1 pam.
 Kansas-State Board of Health. 1 bound vol.
 Kansas-State Mine Insp. 1 pam.
 Kansas City, Kan.-Bldg. Insp. 1 pam.
 Kingston, N. Y.-City Clerk. 1 pam.
 Lake Superior Min. Inst. 1 vol.
 Laugaard, Olaf. 1 pam.
 Louisiana-State Board of Health. 1 vol.
 Louisiana State Univ. 1 pam.
 Macon, Ga.-City Clerk. 1 pam.
 Maine-State Board of Health. 1 bound vol.
 Malden, Mass.-Bldg. Insp. 1 pam.
 Master Car Builders' Assoc. 2 bound vol.
 Memphis, Tenn.-City Clerk. 1 pam.
 Michigan-Dept. of State. 1 bound vol.
 Minneapolis & St. Louis R. R. Co. 1 pam.
 Minnesota, Univ. of. 1 vol.
 Montana-State Coal Mine Insp. 1 vol.
 Montgomery, Ala.-City Engr. 1 pam.
 National Conference on City Planning. 1 pam.
 National Education Assoc. 1 pam.
 Nevada-State Insp. of Mines. 1 pam.
 New Hampshire-State Tax Comm. 1 pam.
 New Orleans, La.-Clerk of Common Council. 1 pam.
 New York City-Board of Estimate and Apportionment. 1 pam.
 New York State-Comm. on Sites, Grounds and Bldgs. 1 pam.
 New York State-Public Service Comm., Second Dist. 3 pam.
 New York State-Comm. of Highways. 2 pam.
 New York City Record. 1 bound vol.
 Niagara Falls, N. Y.-City Clerk. 1 pam.
 North Carolina-Geol. and Economic Survey. 1 vol.
 O'Gorman, James A. 1 pam.
 Ohio Eng. Soc. 3 vol.
 Oregon-Highway Engr. 1 pam.
 Oregon-State Conservation Comm. 1 pam.
 Panama R. R. Co. 2 pam.
 Pennsylvania-Dept. of Forestry. 1 vol.
 Pennsylvania-Dept. of Mines. 2 bound vol.
 Pennsylvania-Public Service Comm. 4 pam.
 Pennsylvania-Topographic and Geologic Survey. 1 bound vol.
 Philadelphia, Pa.-Mayor. 3 bound vol.
 Parker, Philip. 1 pam.
 Portland, Ore.-Port of Portland. 1 pam.
 Providence, R. I.-Dept. of Public Works. 1 pam.
 Richardson, Clifford. 1 pam.
 Richmond, Fredericksburg & Potomac R. R. Co. 1 pam.
 Roadmasters and Maintenance of Way Assoc. of America. 1 pam.
 Ross, D. W. 1 pam.
 Saskatchewan, Canada-Board of Highway Commrs. 1 pam.
 Smithsonian Institution. 1 bound vol.
 South Australia-Commr. of Public Works. 1 pam.
 South Dakota-Board of R. R. Commrs. 1 pam.
 Talcott, Charles A. 1 bound vol.
 Tasmania-Commr. of Govt. Rys. 1 pam.
 Tasmania-Geol. Survey. 1 pam.
 Texas Academy of Science. 1 pam.
 Texas, Univ. of. 1 pam.
 Throop Coll. of Tech. 1 pam.
 Union of South Africa-Geol. Survey. 1 vol.
 U. S.-Adjutant-General. 1 vol.
 U. S.-Bureau of Mines. 4 pam.
 U. S.-Bureau of the Census. 2 bound vol., 2 pam.
 U. S.-Chf. of Engrs. 3 bound vol.
 U. S.-Forest Service. 1 pam.
 U. S.-Geol. Survey. 1 pam.
 U. S.-Interstate Commerce Comm. 1 bound vol.
 U. S.-Isthmian Canal Comm. 1 bound vol., 2 vol.
 U. S.-National Museum. 1 vol.
 U. S.-Reclamation Service. 1 pam.
 U. S.-Secy. of Commerce. 1 pam.
 U. S.-Secy. of the Interior. 1 pam.
 U. S.-War Dept. 1 vol.
 Universidad Nacional de la Plata. 1 pam.
 Verkfræðingafélags Íslands. 1 pam.
 Virginia-Bureau of Labor and Industrial Statistics. 1 bound vol.
 Washington-Public Service Comm. 1 vol.
 Washington Southern Ry. Co. 6 pam.
 Washington, Univ. of. 1 pam.
 Western Canada Irrig. Assoc. 2 pam.
 Western New York & Pennsylvania Ry. Co. 6 pam.
 Wisconsin, Univ. of. 1 pam.
 Withington, Sydney. 1 pam.
 Wyoming-State Engr. 1 bound vol.
 Yale Univ. 1 pam.

BY PURCHASE

Die Glas- und Wellblechdeckung der Eisernen Dächer. Von Th. Landsberg. Darmstadt, 1887.

A Text-Book of Mechanical Engineering. By Wilfrid J. Lineham. Part 1, Workshop Practice; Part 2, Theory and Examples. Eleventh Edition, Revised. London, 1914.

Carrying Out the City Plan: The Practical Application of American Law in the Execution of City Plans. By Flavel Shurtleff, in Collaboration with Frederick Law Olmsted. New York, 1914.

Vorlesungen über Wasserkraftmaschinen. Von R. Camerer. Leipzig und Berlin, 1914.

Proceedings of the Seventeenth Annual Meeting of the American Society for Testing Materials; Vol. 14, Part 2. Edited by the Secretary. Philadelphia, 1914.

Transactions of the Institution of Mining and Metallurgy: Twenty-second Session; 1912-13; Vol. 22. New York and London, 1913.

Cranes, Their Construction, Mechanical Equipment and Working. By Anton Böttcher. Translated and Supplemented with English, American, and Continental Practice, by A. Tolhausen. London, 1908.

Iron Ores: Their Occurrence, Valuation and Control. By Edwin C. Eckel. New York and London, 1914.

The Autocar Imperial Year Book, 1914. London.

Das Spiel der Kräfte im Verbundbalken: Eine Darstellung der Lehre vom Verbund, von der Spannungsverteilung und Ermittlung in auf Biegung Beanspruchten Eisenbetonkörpern. Von Georg Fischer. Lissa, I. P., 1914.

Taschenbuch für Bauingenieure. Von Max Foerster. Zweite, verbesserte, und erweiterte Auflage. Berlin, 1914.

Rural Improvement: The Principles of Civic Art Applied to Rural Conditions, Including Village Improvement and the Betterment of the Open Country. By Frank A. Waugh. New York and London, 1914.

A Popular Treatise on the Colloids in the Industrial Arts. By Kurt Arndt. Translated from the Second Enlarged German Edition, by Nahum E. Katz. Easton, Pa., and London, 1914.

The Deposits of the Useful Minerals and Rocks: Their Origin, Form, and Contents. By F. Beyschlag, J. H. L. Vogt, and P. Krusch. Translated by S. J. Truscott. Vol. 1. London, 1914.

Principes et Exemples d'Architecture Ferronniere les Grandes Constructions Edilitaires en Fer la Halle-Basilique. Par L. A. Boileau. Paris, 1881.

The Engineering Index Annual for 1914: Compiled from the Engineering Index Published Monthly in the *Engineering Magazine* During 1914. New York, 1915.

Installing Efficiency Methods. By C. E. Knoeppel. New York, 1915.

SUMMARY OF ACCESSIONS

(From January 4th to February 1st, 1915)

Donations (including 15 duplicates).....	249
By purchase.....	17
Total	266

MEMBERSHIP

(From January 8th to February 4th, 1915)

ADDITIONS

MEMBERS		Date of Membership.	
COOPER, DAVID REGINALD. Hydr. Engr., 500	Assoc. M.	July	1, 1908
Isham St., New York City.....	M.	Dec.	2, 1914
CORNING, DUDLEY TIBBITS. 30 Belle Ave.,	Assoc. M.	Oct.	1, 1902
Troy, N. Y.....	M.	Jan.	6, 1915
MITCHELL, LOUIS ADOLPH. Supt. of Roadway	Assoc. M.	May	31, 1910
and Bldgs., Union Traction Co. of	M.	Jan.	6, 1915
Indiana, Anderson, Ind.....			
POWELSON, WILFRID VAN NEST. Cons. Engr., 60 Wall St.,		Jan.	6, 1915
New York City.....			
ROGERS, CLARENCE MORD. Engr., Board of Public Works,		Jan.	6, 1915
Daytona, Fla.....			
ROLFE, WILLIAM EDWARD. Associate to Pres., Board of		Jan.	6, 1915
Public Impvts., 301 City Hall, St. Louis, Mo.....			
ROSS, THOMAS ALEXANDER. Chf. Engr., Magadi	Assoc. M.	Dec.	3, 1902
Ry., Magadi Junction, via Mombasa,	M.	Oct.	7, 1914
British East Africa.....			
STENGEL, CARL HENRY. Chf. Engr., Eng. and	Assoc. M.	Oct.	3, 1906
Constr. Dept., United Realty & Impvt.	M.	Jan.	6, 1915
Co., 111 Broadway (Res., 2674 Jerome			
Ave., Fordham), New York City.....			
THORNDIKE, STURGIS HOOPER. Cons. Engr. (Fay, Spofford		Jan.	6, 1915
& Thorndike), 308 Boylston St., Boston, Mass.....			
WALDRON, ALBERT EDWIN. Maj., Corps of	Assoc. M.	July	1, 1909
Engrs., U. S. A., Washington Barracks,	M.	Jan.	6, 1915
Washington, D. C.....			

ASSOCIATE MEMBERS

ALDRICH, ELBERT CHRISTOPHER. City Engr., Auburn, N. Y.	Jan.	6, 1915
BECK, ALFRED FORTIN. Chf. Designer and Draftsman,		
Bridge Dept., Seaboard A. L. Ry., 712 Duke St.,		
Norfolk, Va.....	Jan.	6, 1915
BLIGHT, ARTHUR FREDERICK. Asst. Hydr.		
Engr., Pacific Light & Power Corpora-	Jun.	Feb. 28, 1911
tion, 603 Pacific Elec. Bldg., Los	Assoc. M.	Jan. 6, 1915
Angeles, Cal.....		
CAREW, FRANK JEROME. Care, Herbert Howe, 1040 Faile		
St., New York City.....	Jan.	6, 1915
CHIVERS, NORMAN MOORE. Junior Engr., U. S. Engr. Dept.,		
Elizabethtown, N. C.....	Jan.	6, 1915
COLLINS, RICHARD VINCENT. Res. Engr., State Highway		
Dept., Hornell, N. Y.....	Jan.	6, 1915

ASSOCIATE MEMBERS (<i>Continued</i>)		Date of Membership.	
DAVY, JESSE JOHN. Dist. Engr., State Highway Comm., Preston, Minn.....		Oct.	1, 1912
DUBUIS, JOHN. Eng. Insp., Desert Land Board, State of Oregon, 1155 North Summer St., Salem, Ore.....	Jun. Assoc. M.	Oct. Jan.	1, 1912 6, 1915
EGE, CHARLES RAYMOND. Prin. Asst. Engr. for State High- way Commr., P. O. Box 14, Olympia, Wash.....		Jan.	6, 1915
ELLIOTT, JOHN ARTHUR. Dist. Engr., Oregon State High- way Comm., Wyeth, Ore.....		Jan.	6, 1915
HALL, CHARLES LACEY. First Lieut., Corps of Engrs., U. S. A., 305 Southern Bldg., Washington, D. C.....	Jun. Assoc. M.	June Jan.	30, 1910 6, 1915
HARRIS, FRANK SAMPSON MASON. Asst. Engr., Panama-Pacific International Ex- position, 454 Sixty-first St., Oakland, Cal.....	Jun. Assoc. M.	Mar. Jan.	5, 1912 6, 1915
HAYES, FERDINAND EUGENE, JR. Care, Beth- lehem Chili Iron Mines Co., La Higuera, Coquimbo, Chili.....	Jun. Assoc. M.	Feb. Nov.	4, 1908 4, 1914
HOWSON, GEORGE WILLIAM. Civ. and Hydr. Engr., Sierra & San Francisco Power Co., 58 Sutter St., San Francisco, Cal.	Jun. Assoc. M.	Oct. Jan.	5, 1909 6, 1915
HOWSON, LOUIS RICHARD. Prin. Asst. Engr., Alvord & Burdick, 641 East 50th Pl., Chicago, Ill.....		Dec.	2, 1914
JOHNSTON, WALTER WIER. 1300 Leighton Ave., Anniston, Ala.....		Jan.	6, 1915
KENNISON, KARL RAYMOND. Prin. Asst. to John R. Free- man, 815 Grosvenor Bldg., Providence, R. I.....		Jan.	6, 1915
LINDERS, JOHN EDWARD AUGUST. Engr. in Chg., Drawing Room, The J. W. Frazier Co., 2205 Bellefield Ave., Cleveland, Ohio.....		Sept.	2, 1914
MASURY, ALFRED FELLOWS. Chf. Engr., International Motor Co., 345 West 70th St., New York City.....		Jan.	6, 1915
MUMFORD, GURDON SALTONSTALL. Pres., Unit Wall Constr. Co., 1328 Broadway, New York City.....		Sept.	2, 1914
PORTER, ELMER ALFRED. Dist. Engr., U. S. Geological Survey, 421 Federal Bldg., Salt Lake City, Utah.....	Jun. Assoc. M.	Oct. Jan.	1, 1912 6, 1915
REDDICK, JOHN BURKE. Civ., Hydr. and Min. Engr. (Jones, Hanscom & Reddick, Inc.), 102 Humboldt Bank Bldg., San Francisco (Res., 3014 College Ave., Berkeley), Cal.....		Sept.	2, 1914
RUGE, BERNARD ARNOLD. Secy.-Treas., Ward Carpenter & Co., Inc., 95 Franklin St., Tarrytown, N. Y.....		Jan.	6, 1915
SADLER, CHARLES BOONE. Asst. Engr., Baltimore Sewerage Comm., 907 Arlington Ave., Baltimore, Md.....		Jan.	6, 1915

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
SAWYER, ERNEST WALKER. Canadian Mgr., The Universal Radio Syndicate, Ltd., Newcastle, N. B., Canada.....	} Jun.	May 7, 1913
		Jan. 6, 1915
	Assoc. M.	
SICKLES, RAYMOND. Engr., Larkin & Sangster, Seneca Falls, N. Y.....		Sept. 2, 1914
TIFFANY, NATHAN NEWTON. Civ. Engr. and Surv.; Member, Board of Super- visors, Suffolk County, East Hamp- ton, N. Y.....	} Jun.	June 5, 1906
		Jan. 6, 1915
	Assoc. M.	
TITUS, WILLIAM JACY. 1710 Central Ave., Indianapolis, Ind.....		Dec. 2, 1914
WAALKES, GERRIT. Chf. Draftsman, Mt. Vernon Bridge Co., 201 North Park St., Mt. Vernon, Ohio.....		Jan. 6, 1915
WHITNEY, FRANKLIN LEMUEL. Care, Honduras Drug Co., La Ceiba, Honduras.....		Nov. 4, 1914
YOUNG, CLARENCE RICHARD. Asst. Prof. of Structural Eng., Univ. of Toronto, 98 Hilton Ave., Toronto, Ont., Canada.....		Jan. 6, 1915

ASSOCIATES

BRITTON, JOHN ALEXANDER. Vice-Pres., Gen. Mgr., and Chf. Engr., Pacific Gas & Elec. Co., 445 Sutter St., San Francisco, Cal.....	Jan. 6, 1915
MICKEY, CLARK EDWIN. Asst. Prof. of Applied Mechanics, Univ. of Nebraska; Cons. and Testing Engr., Lincoln, Nebr.....	Jan. 6, 1915

JUNIORS

ANDERSON, JOHN HENNING. Road Advisor, Universal Port- land Cement Co., 208 South La Salle St., Room 1532, Chicago, Ill.....	Jan. 6, 1915
BICKERTON, WILBUR EARL. In Chg., Designing and Esti- mating Dept., Trussed Concrete Steel Co., 141 Milk St., Boston, Mass.....	Jan. 6, 1915
CONNELLY, WALTER LOUIS. Recorder, Detroit Railway Comm., 601 Genesee St., Saginaw, Mich.....	Jan. 6, 1915
DAVIS, WILLIAM EILERT. Box 404, Ventura, Cal.....	Nov. 4, 1914
DURANT, WILLIAM BULLARD. Asst. Engr., Turners Falls Co., Turners Falls, Mass.....	Jan. 6, 1915
FISKE, HAROLD LASELLE. Engr., The Foundation Co., 9 McClellan St., Schenectady, N. Y.....	Jan. 6, 1915
FONT, MANUEL. Asst. San. Engr., Service of Sanitation, San Juan, Porto Rico.....	Jan. 6, 1915
LOWERY, JOHN, JR. 541 Maplewood Ave., Ambridge, Pa..	Jan. 6, 1915
MOONE, MELVIN LYMAN. Draftsman, State Highway Dept., Lansing, Mich.....	Jan. 6, 1915

JUNIORS (*Continued*)

	Date of Membership.
OSBORN, JESSE THOMAS. Asst. Engr., C. M. & St. P. Ry., 1359 Ry. Exchange Bldg., Chicago, Ill.	Jan. 6, 1915
QUINCY, EDMUND. Care, Eng. Dept., Q. & C. Co., 90 West St., New York City	Jan. 6, 1915
STANFORD, JAMES LELAND. 217 Furnald Hall, Columbia Univ., New York City	Jan. 6, 1915
TAUSSIG, JOHN WRIGHT. Care, Raymond Concrete Pile Co., 140 Cedar St., New York City	Jan. 6, 1915
WEBSTER, MAURICE ANDERSON. 4900 Penn St., Frankford, Philadelphia, Pa.	Sept. 2, 1914

REINSTATEMENTS

MEMBER

	Date of Reinstatement.
PHILLIPS, RICHARD HARVEY	Jan. 30, 1915

RESIGNATIONS

ASSOCIATE MEMBER

	Date of Resignation.
PAIGE, JASON	Jan. 6, 1915

DEATHS

- JACOMB-HOOD, JOHN WYKEHAM. Elected Member, February 5th, 1902; died March 6th, 1914.
- KEEFER, THOMAS COLTRIN. Elected Member, April 4th, 1877; Honorary Member, October 1st, 1913; died January 7th, 1915.
- RASINSKY, CHARLES EZEKIEL. Elected Associate Member, July 9th, 1912; died December 26th, 1914.

Total Membership of the Society, February 4th, 1915.

7 704.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(January 2d to February 1st, 1915)

NOTE.—This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- (1) *Journal*, Assoc. Eng. Soc., St. Louis, Mo., 30c.
- (2) *Proceedings*, Engrs. Club of Phila., Philadelphia, Pa.
- (3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
- (4) *Journal*, Western Soc. of Engrs., Chicago, Ill., 50c.
- (5) *Transactions*, Can. Soc. C. E., Montreal, Que., Canada.
- (6) *School of Mines Quarterly*, Columbia Univ., New York City, 50c.
- (7) *Gesundheits Ingenieur*, München, Germany.
- (8) *Stevens Institute Indicator*, Hoboken, N. J., 50c.
- (9) *Engineering Magazine*, New York City, 25c.
- (11) *Engineering* (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c.
- (12) *The Engineer* (London), International News Co., New York City, 35c.
- (13) *Engineering News*, New York City, 15c.
- (14) *Engineering Record*, New York City, 10c.
- (15) *Railway Age Gazette*, New York City, 15c.
- (16) *Engineering and Mining Journal*, New York City, 15c.
- (17) *Electric Railway Journal*, New York City, 10c.
- (18) *Railway Review*, Chicago, Ill., 15c.
- (19) *Scientific American Supplement*, New York City, 10c.
- (20) *Iron Age*, New York City, 20c.
- (21) *Railway Engineer*, London, England, 1s. 2d.
- (22) *Iron and Coal Trades Review*, London, England, 6d.
- (23) *Railway Gazette*, London, England, 6d.
- (24) *American Gas Light Journal*, New York City, 10c.
- (25) *Railway Age Gazette*, Mechanical Edition, New York City, 20c.
- (26) *Electrical Review*, London, England, 4d.
- (27) *Electrical World*, New York City, 10c.
- (28) *Journal*, New England Water-Works Assoc., Boston, Mass., \$1.
- (29) *Journal*, Royal Society of Arts, London, England, 6d.
- (30) *Annales des Travaux Publics de Belgique*, Brussels, Belgium, 4 fr.
- (31) *Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand*, Brussels, Belgium, 4 fr.
- (32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
- (33) *Le Génie Civil*, Paris, France, 1 fr.
- (34) *Portefeuille Economiques des Machines*, Paris, France.
- (35) *Nouvelles Annales de la Construction*, Paris, France.
- (36) *Cornell Civil Engineer*, Ithaca, N. Y.
- (37) *Revue de Mécanique*, Paris, France.
- (38) *Revue Générale des Chemins de Fer et des Tramways*, Paris, France.
- (39) *Technisches Gemeindeblatt*, Berlin, Germany, 0, 70m.
- (40) *Zentralblatt der Bauverwaltung*, Berlin, Germany, 60 pfg.
- (41) *Electrotechnische Zeitschrift*, Berlin, Germany.
- (42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, \$1.
- (43) *Annales des Ponts et Chaussées*, Paris, France.
- (44) *Journal*, Military Service Institution, Governors Island, New York Harbor, 50c.
- (45) *Colliery Engineer*, Scranton, Pa., 25c.
- (46) *Scientific American*, New York City, 15c.
- (47) *Mechanical Engineer*, Manchester, England, 3d.
- (48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60m.
- (49) *Zeitschrift für Bauwesen*, Berlin, Germany.
- (50) *Stahl und Eisen*, Düsseldorf, Germany.
- (51) *Deutsche Bauzeitung*, Berlin, Germany.
- (52) *Rigische Industrie-Zeitung*, Riga, Russia, 25 kop.
- (53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria, 70h.
- (54) *Transactions*, Am. Soc. C. E., New York City, \$12.
- (55) *Transactions*, Am. Soc. M. E., New York City, \$10.
- (56) *Transactions*, Am. Inst. Min. Engrs., New York City, \$6.

- (57) *Colliery Guardian*, London, England, 5d.
 (58) *Proceedings*, Engrs.' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
 (59) *Proceedings*, American Water-Works Assoc., Troy, N. Y.
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
 (61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
 (62) *Steel and Iron*, Thaw Bldg., Pittsburgh, Pa., 10c.
 (63) *Minutes of Proceedings*, Inst. C. E., London, England.
 (64) *Power*, New York City, 5c.
 (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
 (66) *Journal of Gas Lighting*, London, England, 6d.
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.
 (68) *Mining Journal*, London, England, 6d.
 (69) *Der Eisenbau*, Leipzig, Germany.
 (71) *Journal*, Iron and Steel Inst., London, England.
 (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
 (72) *American Machinist*, New York City, 15c.
 (73) *Electrician*, London, England, 18c.
 (74) *Transactions*, Inst. of Min. and Metal., London, England.
 (75) *Proceedings*, Inst. of Mech. Engrs., London, England.
 (76) *Brick*, Chicago, Ill., 20c.
 (77) *Journal*, Inst. Elec. Engrs., London, England, 5s.
 (78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
 (79) *Forschearbeiten*, Vienna, Austria.
 (80) *Tonindustrie Zeitung*, Berlin, Germany.
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
 (82) *Mining and Engineering World*, Chicago, Ill., 10c.
 (83) *Gas Age*, New York City, 15c.
 (84) *Le Ciment*, Paris, France.
 (85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.
 (87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.
 (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., \$5.
 (90) *Transactions*, Inst. of Naval Archts., London, England.
 (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
 (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
 (95) *International Marine Engineering*, New York City, 20c.
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
 (98) *Journal*, Engrs. Soc. Pa., Harrisburg, Pa., 30c.
 (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$2.
 (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
 (101) *Metal Worker*, New York City, 10c.
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
 (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.
 (106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
 (108) *Southern Machinery*, Atlanta, Ga., 10c.
 (109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
 (110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.

LIST OF ARTICLES

Bridges.

- Construction Features, Fallsway Viaduct, Baltimore, Md.* (87) Nov.
 The City Avenue Arch Bridge, Philadelphia, Pa.* (87) Nov.
 The Highway Bridges of the City of Pittsburgh.* N. S. Sprague. (98) Nov.
 Reinforced Concrete Floors for Steel Bridges, Buffalo, Rochester & Pittsburgh Railway.* A. M. Wolf. (87) Dec.
 Progress on the New Quebec Bridge.* H. P. Borden. (96) Dec. 31; (13) Jan. 7; (14) Jan. 16.
 Test of Full-Size Reinforced-Concrete Bridge Slab; Determination at Arlington Experimental Farm of Stress Distribution and Other Phenomena in Slab under Various Loadings.* (14) Jan. 2.
 Construction Features of the Bloomfield Bridge, Pittsburgh, Pa.* A. E. Sortore. (86) Jan. 6.
 Floors for Steel Highway Bridges in Illinois.* Clifford Older. (Paper read before the Am. Road Builders' Assoc.) (86) Jan. 6.

*Illustrated.

Bridges—(Continued).

- The 12th St. Double-Deck Viaduct at Kansas City; a Reinforced Concrete Viaduct 2 265 Ft. Long.* (13) Jan. 7.
- Concrete Viaducts on the Pennsylvania Railroad.* Day Allen Willey. (19) Jan. 9.
- Reinforced-Concrete Highway Trestle; Loadings, Distribution for Maximum Stress, and Design of Standard Structure for the State of Arizona.* S. M. Cotton. (14) Jan. 9.
- Substructure of the Trent River Bridge.* (14) Jan. 9.
- A Swinging Pontoon Bridge at Panama.* (62) Jan. 11; (18) Jan. 16.
- A New and Simplified Derivation of the Most General Form of the Theorem of Three Moments.* G. A. Maney. (86) Jan. 13.
- A Bridge Sidewalk Failure Due to Paving Expansion.* (13) Jan. 14.
- St. Clair Avenue Bridge, Toronto.* E. M. Proctor. (96) Jan. 14.
- Causeway at New Philadelphia, Ohio.* Edward Stingel. (14) Jan. 16.
- Bascule Bridge Acting as a Simple Truss Span.* (13) Jan. 21.
- Concrete Pier Work on the Cumberland Valley R. R. Bridge over the Potomac.* (13) Jan. 21.
- Important Questions on Highway-Bridge Design. Willis Whited. (13) Jan. 21.
- A Floating-Pile Foundation in Silt.* (13) Jan. 28.
- Foundations for Railway Bridge Over the St. John River, N. B.* (96) Jan. 28.
- Les Ponts Militaires pour l'Etablissement de Passages Improvisés. A. Bidault des Chaumes. (33) Serial beginning Jan. 9.
- Die Neue Ohlbrücke bei Kenova in West Virginia.* Georg Chr. Mehrtens. (69) Nov.
- Lastverteilung bei Plattenbalkenbrücken.* (107) Dec. 19.
- Neues Verfahren zur raschen Ermittlung der Formen und Normalkräfte von Gewölben.* R. Färber. (51) Sup. No. 1, 1915.
- Die Kaiser-Wilhelm-Brücke in Fürstenwalde a. d. Spree.* Karl Bernhard. (48) Jan. 2.
- Die neue Aarebrücke in Olten.* E. Froté. (107) Jan. 2.
- Zerlegbare Brücken für Kriegsstrassen und sonstige Notbrücken.* F. von Emperger. (78) Jan. 4.
- Zur Frage der Lastverteilung bei Plattenbalkenkonstruktionen.* Ph. Leip. (78) Serial beginning Jan. 4.

Electrical.

- New Turbine Plant at Liverpool.* (26) Dec. 25.
- The Successful Operation of a Telephone System Paralleling High-Tension Power Lines.* Charles E. Bennett. (Abstract from *General Electric Review*.) (73) Dec. 25.
- The Western Electric Machine-Switching Telephone System.* G. H. Green. (73) Serial beginning Dec. 25.
- Air-Gap Flux Distribution in Dynamo-Electric Generators.* Alfred Still. (3) Jan.
- Theoretical Investigation of Electric Transmission Systems Under Short Circuit Conditions.* I. W. Gross. (42) Jan.
- Switch and Transformer Oils. (Report of the Research Committee of the Institution of Elec. Engrs.) (77) Jan.
- Air Filters for Turbo-Generators.* (12) Jan. 1.
- The Economic Significance of the Relation Between Line Voltage and Lamp Voltage. M. D. Cooper. (Abstract from *General Electric Review*.) (73) Jan. 1.
- High-Voltage Dangers Present in Static Transformers Due to Electrostatic Capacity of the Windings.* J. Lindley Thompson and S. Austen Stigant. (26) Serial beginning Jan. 1.
- Power Plant Testing.* W. M. Selvey. (77) Jan. 1.
- Electromagnets for Alternating Current Circuits.* Norman G. Meade. (64) Jan. 5.
- The Barton Power Scheme of the Manchester Corporation.* (26) Jan. 8.
- Electric Motor Drive of a Large Flour Mill.* (27) Jan. 9.
- Power Plant of American Engineering Company.* (64) Jan. 12.
- Automatic Protective Switchgear for Alternating Current Systems.* E. B. Wedmore. (77) Jan. 15.
- Recent Developments at the Salford Electricity Works.* (26) Jan. 15.
- Interconnected Electric Service in Iowa.* (27) Jan. 16.
- A Labor-Saving Transmission-Line Chart.* H. B. Dwight. (27) Jan. 16.
- Electricity in Central-Station Offices.* (27) Jan. 23.
- Power Plant of the J. B. Stetson Company.* Warren O. Rogers. (64) Jan. 26.
- Electric Service in and near Peoria, Ill.* (27) Jan. 30.
- The Electrical Constants of Antennas.* Louis Cohen. (27) Jan. 30.
- Using Volcanic Steam for the Production of Electrical Energy.* (46) Jan. 30.
- Hohlmaaten aus Eisenbeton.* Hugo Fischer. (48) Aug. 1.
- Elektrische Wellen und Schwingungen zur Erforschung des Erdinnern. Gotthelf Leimbach. (48) Aug. 8.
- Überspannungsschutz durch Drosselspulen und Kondensatoren.* E. Pfäffner. (41) Dec. 10.

* Illustrated.

Electrical—(Continued).

- Die beste Art des Handbetriebes für ein grosses Fernsprechnetz. W. Pinkert. (41) Serial beginning Dec. 10.
 Bestimmung der Leitungskonstanten bei einer Uebertragung mittels Einfachkabeln.* C. F. Proos. (41) Dec. 17.
 Bedroht drahtlose Telegraphie das organische Leben? (41) Jan. 7.
 Ueber den Ersatz vorhandener Bogenlampen durch Halbwatt-Glühlampen.* A. Boje. (41) Serial beginning Jan. 7.
 Zur Berechnung elektrischer Wicklungen.* Georg Meyer. (41) Jan. 7.

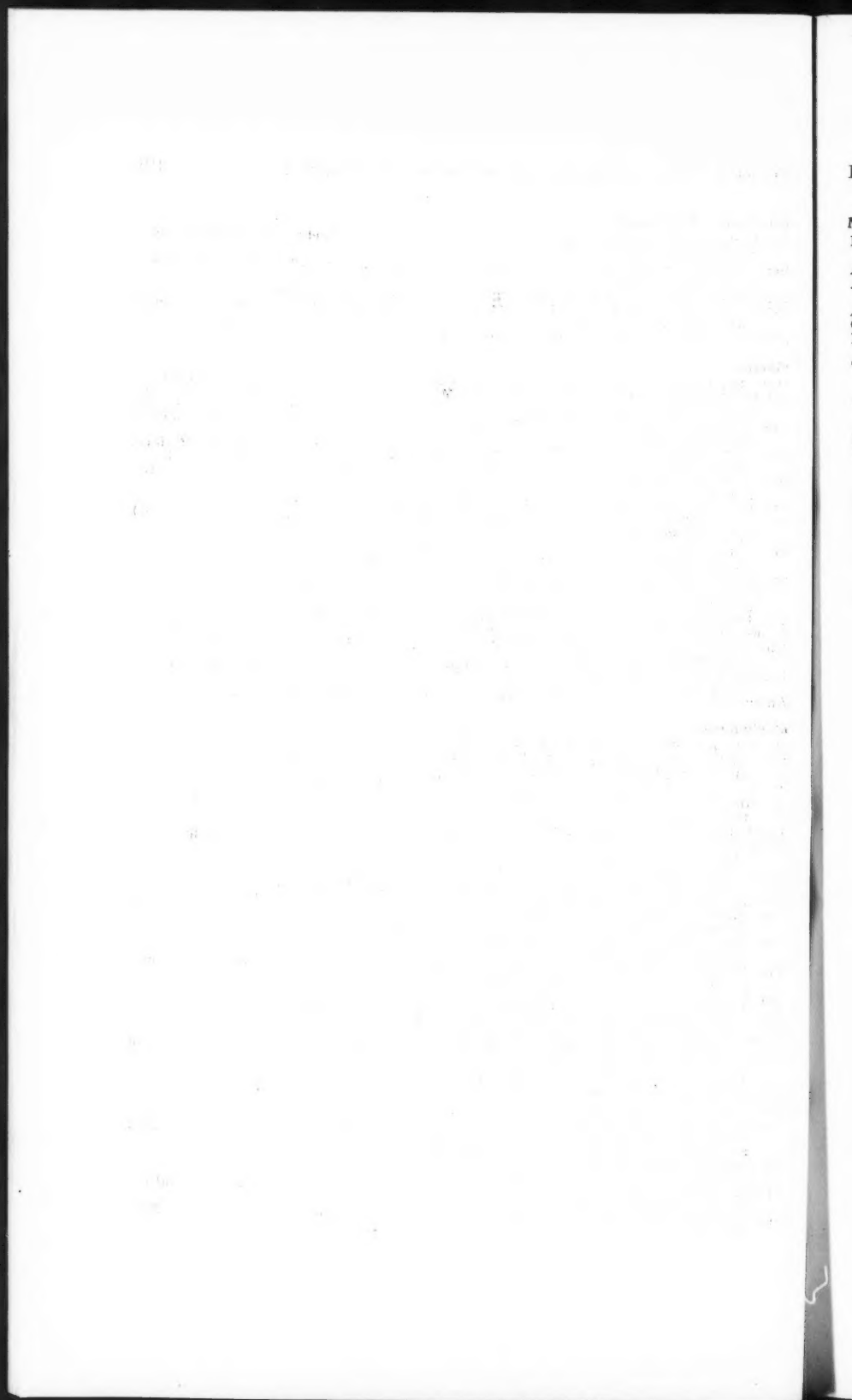
Marine.

- T. S. SS. *Ciudad de Buenos Aires* and *Ciudad de Monte Video*.* (11) Dec. 25.
 Safety Valves for Marine Work.* Donald Macnicoll. (Paper read before the Institution of Engrs. and Shipbuilders in Scotland.) (47) Serial beginning Dec. 25.
 The Assessment of Damage to Maritime Works.* Ernest Latham. (11) Serial beginning Jan. 8.
 The Governing of Marine Engines and High-Speed Auxiliaries.* R. J. Walker. (Paper read before the Assoc. of the Inst. of Marine Engrs.) (47) Jan. 8.
 Report of the Committee of Board of Trade on Ships' Bulkheads. (11) Jan. 8; (12) Jan. 8.
 The Naval Repair Ship *Vestal*.* L. J. Connelly. (72) Jan. 14.
 Proposed Method of Constructing Pearl Harbor Dry Dock.* (13) Jan. 14; (14) Jan. 16.
 To Cuba by Rail, the Last Link Between Key West and Havana Joined (by Ferry).* Harry Chapin Plummer. (19) Jan. 16; (15) Jan. 29.
 Submarines That are Strictly Invisible.* Simon Lake. (46) Jan. 16.
 A Submarine for the Austro-Hungarian Navy.* Frederick C. Coleman. (46) Jan. 23.
 The Periscope, How It is Constructed and Manipulated.* (46) Jan. 30.
 Le Ferry-Boat Brise-Glace *Leonard* du Transcontinental Railway.* (33) Jan. 2.
 Die neuere Entwicklung des Schiffsmotors einschliesslich des Schiffsantriebes.* O. Cornehlis. (48) Aug. 1.
 Erproben von Spiralbohrern für den Pressluftbetrieb auf der Kaiserlichen Werft Kiel.* Tjard Schwarz. (48) Aug. 15.
 Anlass- und Regulierapparate für Motoren auf Kriegsschiffen. (41) Jan. 7.

Mechanical.

- Electric Arc Welding. J. H. Bryan. (61) Nov. 17.
 New Coke Oven and By-Product Recovery Installation at Newton Cap Colliery, Bishop, Auckland.* Frederick C. Coleman. (57) Dec. 18.
 A New Duxford Diesel Engine. (12) Serial beginning Dec. 25.
 An Analysis of the Benefits of Electric Drive in Cement Mills.* Thos. H. Arnold. (67) Jan.
 Bituminous Coal Storage. (45) Jan.
 Friction Losses in the Universal Joint.* P. F. Walker and W. J. Malcolmson. (55) Jan.
 Pyott Gravel and Sand Plant.* (67) Jan.
 Safety Code for Abrasive Wheels and Grinding Machines. (108) Jan.
 Standardization in the Factory. Carl Bennett. (55) Jan.
 The Effect of Variation of Specific Heat with Temperature on the Theoretical Efficiency of the Diesel Engine. S. Lees. (11) Jan. 1.
 The Measurement of Gas in Large Volumes. J. F. Wing. (Paper read before the Am. Gas Inst.) (24) Jan. 4; (83) Jan. 15.
 The South Gas-Works at Amsterdam: Their Electrical and General Equipment.* J. Van Rossum du Chattel. (66) Jan. 5.
 The Cyanamid Works at Niagara Falls.* (13) Jan. 7.
 The Manufacture of the Diesel Engine.* O. J. Abell. (20) Jan. 7.
 New Implement Foundry of Deere & Co.* (20) Jan. 7.
 Utilizing Waste Heat in a Drop Forge Shop.* (20) Jan. 7.
 Heavy Electric Reversing Mills. Wilfred Sykes. (Paper read before the Iron and Steel Elec. Engrs.) (47) Jan. 8.
 The Latest Campbell Oil Engine.* (12) Jan. 8.
 Flat Steel Ropes Support Aerial Ferry for Automobiles.* (14) Jan. 9.
 Grouting a Leaking Tunnel.* (14) Jan. 9.
 Heavy Car Dumping Plant, Moved 214 Feet in 2½ Days: Steel Tower, 116 Feet High, Machinery, Boilers and Coal Pockets, Weighing 800 Tons, were Handled as a Unit on Rollers.* (14) Jan. 9.
 Oil-Burning Steam Station in Seattle, Wash.* (27) Jan. 9.
 By-Product Ovens at Baltimore, Md.* (24) Jan. 11.
 Report of Committee on Differential Rates, National Commercial Gas Association. F. W. Frueauff. (24) Jan. 11.
 Constructional Work in Gas-Works.* F. Gorman. (Paper read before the Midland Junior Gas Assoc.) (66) Jan. 12.

*Illustrated.



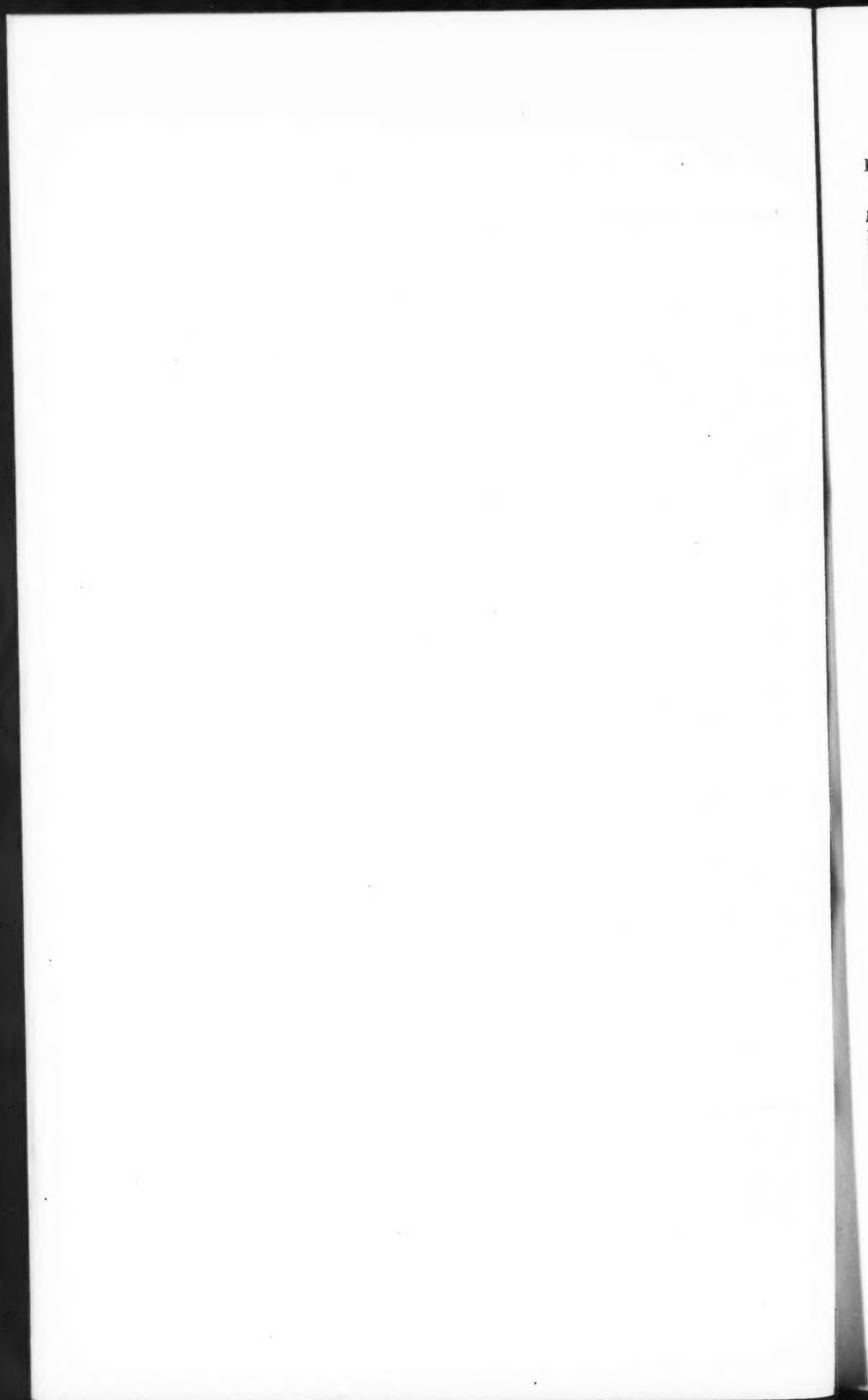
Mechanical—(Continued).

- Electrical Power Plants in Gas Works; Their Choice, Installation, and Operation. (66) Serial beginning Jan. 12.
- A Dragline Excavator with Wagon Loader.* (13) Jan. 14.
- Aeronautics.* Algernon E. Berriman. (Paper read before the North-east Coast Institution of Engrs. and Shipbuilders.) (47) Jan. 15.
- Aerial Ropeways.* (12) Serial beginning Jan. 15.
- Coal and Its Economical Use. P. S. Thompson. (77) Jan. 15.
- Dump Reclamation by Cableway for Treatment in Mill.* E. A. Colburn, Jr. (82) Jan. 16.
- The Concrete Foundations for Vertical Retorts at the Birkshall Gas-Works, Bradford.* Ernest J. Sutcliffe. (Paper read before the Yorkshire Junior Gas Assoc.) (66) Jan. 19.
- The Balancing of High-Speed Machinery.* H. D. Wheeler and R. V. Southwell. (11) Jan. 15.
- Grinding-Machines. Joseph Horner. (11) Serial beginning Jan. 15.
- Plant with Heavy Tools on Concrete Piling.* (20) Jan. 21.
- Welding of High Pressure Mains.* J. D. Shattuck. (From paper read before the Am. Gas Inst.) (24) Serial beginning Jan. 25.
- Sizes of Pipes for High Pressure Gas Mains.* J. M. Spitzglass. (24) Jan. 25.
- Forced Draft Cooling Towers.* E. Raymond Goodrich. (64) Jan. 26.
- The Junkers Oil Engine.* F. E. Junge. (9) Feb.
- Heat Losses and the Economical Design of Steam Piping.* A. Langstaff Johnston, Jr. (9) Feb.
- Chemistry of the Incandescent Gas Mantle. H. S. Miner. (Paper read before the Electro-Chemical Soc.) (24) Feb. 1.
- Checks on Control of Boiler Operation.* Franz Denk. (62) Feb. 1.
- Present and Future of Outdoor Lighting.* Alonzo P. Ewing. (Paper read before the N. C. G. A.) (83) Feb. 1.
- Welding Gas Main Joints and Specials.* (83) Feb. 1.
- Les Machines Automatiques de M. Jean Bardet.* J. Biderman. (37) July 31.
- Pelle à Vapeur pour l'Exécution Rapide des Terrassements.* (33) Jan. 9.
- Amerikanische Personenaufzüge für grosse Hubhöhen und hohe Fahrgeschwindigkeiten.* Franz Freisler. (48) Aug. 1.
- Liegende doppeltwirkende Viertakt-Dieselmotoren.* Friedrich Barth. (48) Serial beginning Aug. 1.
- Die Motoromnibusse der Gesellschaft für elektrische Hoch- und Untergrundbahnen in Berlin.* A. Heller. (48) Aug. 8.
- Neuerungen an den Kondensations- und Kesselanlagen des Elektrizitätswerkes Strassburg, i. E.* H. Büggeln. (48) Aug. 8.
- Neuer Eisenbahnwagen-Drehkran.* Wolfgang Schrader. (48) Aug. 29.
- Neuere Versuchseinrichtungen im Maschinenlaboratorium der Königl. Technischen Hochschule Breslau.* H. Baer. (48) Serial beginning Sept. 5.
- Planmässige Erzeugung schwerer Werkzeugmaschinen.* Otto Jacken. (48) Sept. 26.
- Gleichstrom-Walzenzugmaschine von 700 bis 1000 P. S.* Ernst Zix. (48) Oct. 3.
- Die spezifische Wärme c_p der Luft bei 60°C. und bis 200 at.* L. Holborn und M. Jakob. (48) Oct. 3.
- Die Veränderlichkeit der Gasphase in Gasgenerator.* Kurt Neumann. (48) Serial beginning Oct. 17.
- Die Bedeutung der Elektromobile für den Stromabsatz der Elektrizitätswerke.* H. Beckman. (41) Serial beginning Nov. 12.
- Der Turbinengebläse- und Turbinenkompressorenbau von C. H. Jaeger & Co.* H. Mitter. (48) Serial beginning Nov. 21.
- Ueber Verzinneisenmaschinen.* W. Krämer. (50) Dec. 3.
- Einformen eines schweren Werkzeugmaschinenständers in Sand nach Modell und Schablone.* Hugo Becker. (50) Dec. 17.
- Der augenblickliche Stand der künstlichen Herstellung des Kautschuks. Willy Hinrichsen. (48) Jan. 2.
- Die Dampfturbinen und die Turbogebälde an der Schweiz. Landesausstellung Bern, 1914.* A. Stodola. (107) Serial beginning Jan. 2.
- Der Energieverbrauch von Umkehrantrieben.* Georg Meyer. (50) Serial beginning Jan. 7.

Metallurgical.

- Recent Developments in Cast-Iron Manufacture. J. E. Johnson, Jr. (3) Jan.
- Extension of Messrs. Bolckow, Vaughan's Steel Works.* (11) Jan. 1.
- Iron and Steel: Its Properties, Treatment and Selection for Engineering Purposes. Jas. H. Herron. (Paper read before the Cleveland Eng. Soc.) (47) Jan. 1.
- Arizona Copper's New Smelting Plant.* (103) Jan. 2.
- Electrolytic Zinc, the Reed Process.* E. H. Leslie. (103) Jan. 2.
- Progress in Hydro-Metallurgy in 1914.* Warren Aiken. (82) Jan. 2.
- Recent Progress in the Design of Ore Milling Plants.* Colby M. Avery and C. A. Tupper. (82) Jan. 2.

*Illustrated.



Metallurgical—(Continued).

- Modern Heating Furnaces in Steel Plants.* W. Trinks. (62) Jan. 4.
 Making Steel by the Duplex Process.* Simon Strock Martin. (20) Jan. 7.
 A Sheet Bar and Special Steel Plant.* (20) Jan. 7.
 Spelter: Its Manufacture and Properties. George C. Stone. (Abstract of paper read before the Am. Inst. of Metals.) (47) Jan. 8.
 Southern Aluminum Plant of North Carolina.* Claud Hafer. (82) Jan. 16.
 Tube-Mill Pebbles, Their Characteristics and Cost. Edwin C. Eckel. (103) Jan. 16.
 Blast-Furnace Skips and Transfer Cars.* Frank C. Roberts. (20) Jan. 21.
 Danish Tube-Mill Pebbles and Substitutes. Jay A. Carpenter. (103) Jan. 23.
 Ore Treatment at Cripple Creek: A Review.* P. Henry Argall. (103) Jan. 23.
 Blast-Furnace Charging Apparatus.* Frank C. Roberts. (20) Jan. 28.
 Building a New Plant for Efficiency in Materials Working and Forwarding.* Charles C. Lynde. (62) Feb. 1.
 The Development of Continuous Counter Current Decantation in Cyanidation of Slime.* W. J. Pentland. (105) Feb.
 Limitations of the Electric Furnace in the Manufacture of Steel Castings. G. Muntz. (105) Feb.
 A New Continuous Filter.* (105) Feb.
 The New Copper Metallurgy.* H. A. Megraw. (9) Feb.
 Tube-Milling for the Flotation or Oil-Concentration Process. W. B. Easton. (105) Feb.
 Contributions à l'Etude des Aciers au Nickel. Pierre Chevenard. (93) Aug.
 Gueulard Aménagé par Arthur McKee du Haut-Fourneau No. 2 de la Société Minière et Métallurgique Nickopol-Marioupol.* W. Y. Grebennikow. (93) Aug.
 Note Descriptive sur l'Usine de Senelle de la Société Métallurgique de Senelle-Maubeuge.* Aug. Dondelinger. (93) Aug.
 Influence du Temps de Chauffage avant la Trempe sur les Résultats de Cette Opération.* Albert Portevin. (92) Aug.
 Der Umbau des Hochofenwerkes des Gutehoffnungshütte.* H. Groeck. (48) Serial beginning Dec. 12.
 Neuere amerikanische Winderhitzer. Oskar Simmersbach. (50) Dec. 24.
 Bestimmung des Eisens in Thomasschlacken. L. Blum. (50) Jan. 7.

Military.

- Machining and Erecting 12-in. Mortar Carriages.* George T. Huxford. (72) Jan. 28.
 Péniches Aménagées pour le Transport des Blessés par l'Union des Femmes de France.* (33) Dec. 15.
 Les Mitrailleuses Automatiques.* André Reynier. (33) Serial beginning Jan. 2.
 Die Material- und Masskontrollen in der Kugel- und Kugellager-Fabrik der Deutschen Waffen- und Munitionsfabriken Berlin.* W. Bockermann. (48) Aug. 15.
 Die Modernen Kriegswaffen.* Schwinning. (48) Serial beginning Dec. 19.

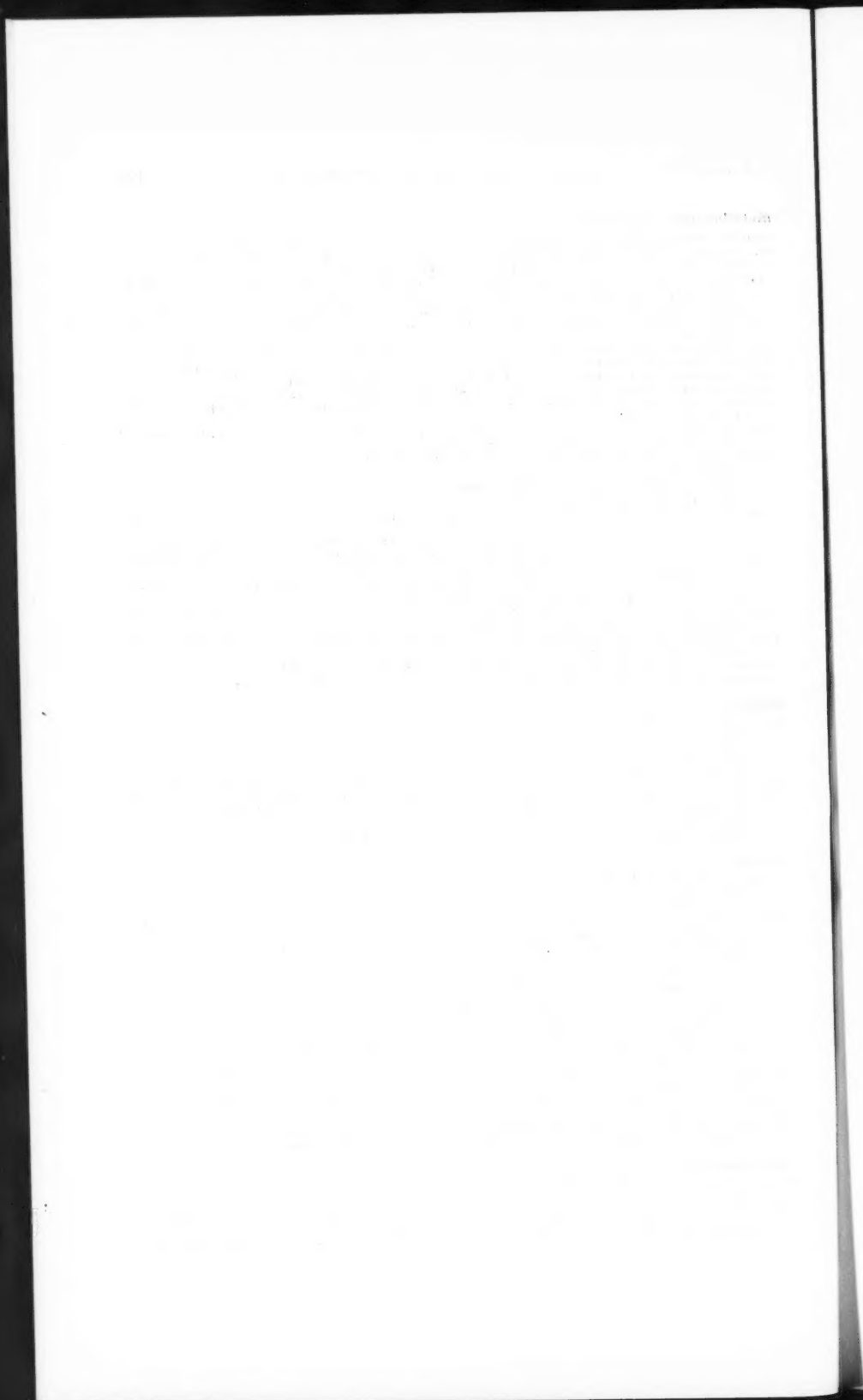
Mining.

- Development of a Moderate Sized Bituminous Coal Mine Operation. E. W. Hess. (98) Nov.
 Coal Stripping in Kansas.* William Z. Price. (45) Jan.
 Arching in Collieries.* Robert G. Clark. (Paper read before the South Wales Inst. of Engrs.) (45) Jan.
 Sinking by the Drop-Shaft Method.* Charles Pilkington and Percy Lee Wood. (45) Jan.
 Humidifying Mine Air. Joseph W. Reed. (Paper read before the Kentucky Min. Inst.) (45) Jan.
 Increasing Use of Concrete in Mine and Mill.* S. R. Stone. (82) Jan. 2.
 An Instrument for Measuring Flame Velocities in Gas and Dust Explosions.* J. D. Morgan. (11) Jan. 8.
 A Study of the Oxidation of Coal.* Horace C. Porter and O. C. Ralston. (From Technical Paper 65, U. S. Bureau of Mines.) (57) Jan. 8.
 Reclaiming Calumet & Hecla Tailings with a Hydraulic Dredge.* Bradlee Van Brunt. (82) Jan. 9.
 Prospecting Wet Placer Ground by Shaft Sinking.* Donald Steel. (103) Jan. 9.
 Preservation of Timber in Mining.* F. K. R. Moll. (103) Jan. 9.
 Förderanlage für die neuen oberbayerischen Erzgruben der deutsch-luxemburgischen Bergwerks- und Hütten-A.-G.* W. Pickersgill. (48) Sept. 26.

Miscellaneous.

- Some Aspects of the Work of the Illinois Utilities Commission. Robert M. Feustel. (4) Dec.
 Some Practical Applications of the Principles of Statistics. Charles S. Ruffner. (Paper read before the Engrs. Club of St. Louis.) (1) Dec.
 The Best Control of Public Utilities.* Frank G. Baum. (42) Jan.; (11) Jan. 23.

*Illustrated.



Miscellaneous—(Continued).

- The Commission-Manager Form of Government and Its Relation to the Engineering Profession. Henry M. Waite. (109) Jan.
 Measuring Efficiency. H. L. Gantt. (55) Jan.
 Computing Machines in Engineering.* P. H. Skinner. (13) Jan. 7.
 Photometry of Incandescent Lamps and Burners.* J. W. Roper. (Paper read before the Yorkshire Junior Gas Assoc.) (66) Jan. 19.
 The Transportation Problem on Surveys in the Canadian North. J. A. MacDonald. (96) Jan. 21.
 Feldspar as a Possible Source of American Potash. Allerton S. Cushman and George W. Coggeshall. (Paper read before the Am. Inst. of Chemical Engrs.) (105) Feb.
 Increased Taxation of Public Utilities. Edward Gruhl. (Paper read before the Wisconsin Elec. Assoc.) (83) Feb. 1.
 Bautechnische Verwertung des Torfes, insbesondere zur Schalldämpfung.* Guntram Mahir. (7) Oct. 17.

Municipal.

- Proposed Standard Specifications for One and Two Course Concrete Highway.* (110) Oct.
 Proposed Standard Specifications for One and Two Course Concrete Street Pavement. (110) Oct.
 Road Improvement. W. A. McLean. (Paper read before the Am. Road Builders' Assoc.) (96) Dec. 31.
 Brick Roads and Streets. John Laylin. (60) Jan.
 Concrete Curb and Gutter as Constructed in Denver, Colo.* E. B. Van de Greyn. (60) Jan.
 Concrete for Paving.* G. W. Pickels. (60) Jan.
 Convict Labor on Country Roads.* George C. Warren. (Paper read before the General Federation of Women's Clubs.) (60) Jan.
 Economic Limit of Pavement Repairs. George H. Norton. (36) Jan.
 Traffic Congestion Problem in Brooklyn, N. Y. W. H. Messenger. (Paper read before the Brooklyn Engrs. Club.) (60) Jan.
 Better Brick Roads for Illinois.* Charles D. Stillwell. (From the *Farmers' Review*.) (76) Jan. 5.
 Conditions Determining Maximum Grades and Methods and Cost of Road Grading in West Virginia.* A. D. Williams. (Paper read before the Am. Road Congress.) (86) Jan. 6.
 Road Location and the Economics of Road Improvement. D. Tucker Brown. (86) Jan. 6.
 Wood Block Pavement After 6 Years Service.* (14) Jan. 9.
 Wood Block Pavement without Cushion Layer of Sand, Experimental Section in Business Center of Chicago, Laid Directly on Concrete Base and Covered with Hot Pitch and Sand.* (14) Jan. 9.
 Analyses of Asphaltic Concrete and Asphalt Block Laid in Washington, D. C., in 1914. (From Report of the Engineer Department.) (86) Jan. 13.
 The Cementing Value of Bituminous Binders and Results Obtained in Some Commercial Tests.* Lester Kirschbaum. (From *Journal of Industrial and Engineering Chemistry*.) (86) Jan. 13.
 Standard Concrete Culverts Recommended by the Michigan Highway Department. (86) Jan. 13.
 The Columbia Highway in Oregon.* (13) Jan. 14.
 Notes on Concrete Road Construction. (Abstract of paper read before the Good Roads Congress.) (13) Jan. 14.
 Protecting Newly Paved Streets. (13) Jan. 14.
 Resurfacing Asphalt Pavements in San Francisco, Cal. James Owen. (13) Jan. 14.
 Subways for Public-Utility Pipes and Wires in Chicago Streets. (13) Jan. 14.
 Destructor Clinker Pavements. George Mawbey. (104) Jan. 15.
 Bituminous Macadam by the Cold-Mixing Method. (14) Jan. 16.
 Test Pavement of Creosoted Blocks at Kansas City. (14) Jan. 16.
 Analysis of Concrete Curb Construction for Suburban Improvements near New York City.* Allen C. Haskell. (86) Jan. 20.
 A City Street Traffic Investigation; Bridgeport, Conn.* Alfred F. Muller. (13) Jan. 21.
 Electric Street Sprinkler does Work of Three Teams.* (14) Jan. 23.
 Costs Reduced by Monolithic Curb, Gutter and Pavement.* (14) Jan. 23.
 Pavement Troubles Along Car Tracks Eliminated; Wood Block Laid on 1:4 Cement and Sand Cushion Sprinkled with Water, Prove Satisfactory at Newark, N. J. (14) Jan. 23.
 An Example of the Improvement of a Section of Lightly Travelled Country Road Using Funds Limited in Amount. S. P. Hooker. (Paper read before the Am. Road Congress.) (86) Jan. 27.
 Power Road Machinery with Special Reference to Hauling and Earth Road Grading.* N. DeWind. (Paper read before the Missouri State Engrs. Assoc.) (86) Jan. 27.

*Illustrated.

F
M
A
E
U
F
.

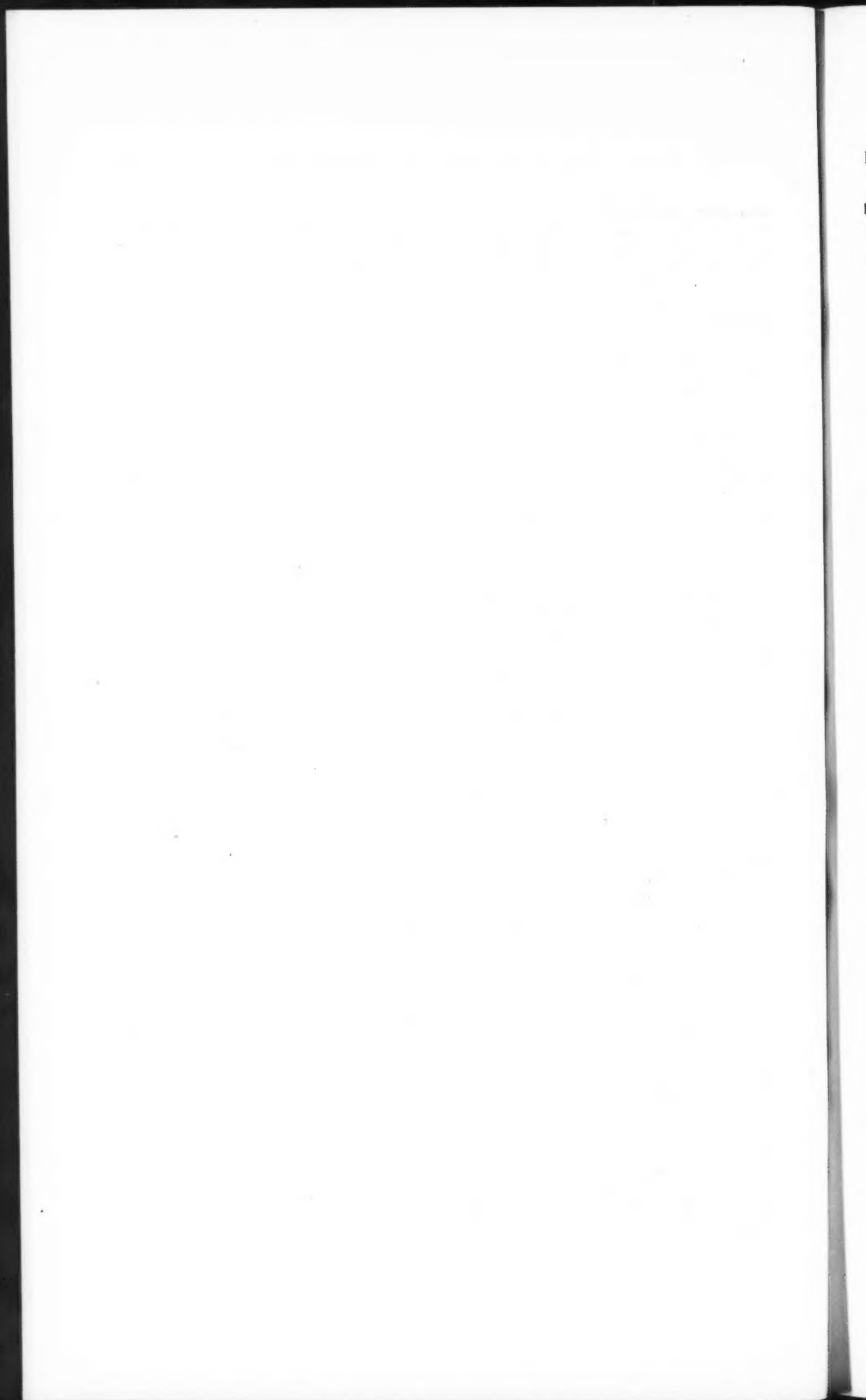
Municipal—(Continued).

- Analysis of Cost of Hauling on Country Roads.* T. R. Agg. (Abstract of paper read before the Good Roads Congress.) (13) Jan. 28.
 Brick Pavement Experience in Toronto, Ont.* (13) Jan. 28.
 Ueber die Art der Strassenbenennung unter besonderer Berücksichtigung Gross-Berliner Verhältnisse. E. Maul. (39) Nov. 20.

Railroads.

- The Illinois Central New Central Station and Track Elevation, Memphis, Tenn.* (87) Oct.; (15) Jan. 29.
 Proper Method of Rail Renewals. A. M. Clough. (Paper read before the Roadmasters' and Maintenance of Way Assoc. of Am.) (87) Oct.
 Proper Type of Track Accessories. M. Donahoe. (Paper read before the Roadmasters' and Maintenance of Way Assoc. of Am.) (87) Oct.
 Single Track Automatic Block Signals Between Sioux City and Missouri Valley, Chicago & North Western.* (87) Oct.
 Gray-Thurber System of Automatic Train Control as Applied to an Automatic Signal System.* (87) Nov.
 Reinforced Concrete Fence Posts, B. R. & P. Ry.* (87) Nov.
 Installation of Twenty-First Street Crossings, Chicago.* A. M. Cornell. (87) Nov.
 Method and Progress of Lining C., B. & Q. Ry. Tunnel at Arminto, Wyo.* (87) Dec.
 The Parcel Post and Its Effect on Railway Revenues. V. J. Bradley. (65) Dec.
 Railroad Valuation. H. H. Edgerton. (87) Dec.
 Signals and Interlocking, Jersey City Terminals, Central Railroad of New Jersey.* (87) Dec.
 Standard Mileage and Sea Level Datum for Railways. (87) Dec.
 The Selection of a Railroad Track Scale.* Eugene Motchman. (62) Dec. 21.
 Automatic Train Stops; Chicago and Eastern Illinois R. R.* (21) Jan.
 Axle-Boxes 0-6-2 Tank Engines; Taff Vale Railway.* (21) Jan.
 Calculation of Values in A. C. Track Circuiting.* (21) Jan.
 Electrical Resonance Apparatus for Track-Circuiting Purposes.* (21) Jan.
 Erie Caboose with Steel Center Sills.* (25) Jan.
 The Grinding Wheel in the Railroad Shop.* B. F. Jacobs. (108) Jan.
 Lubrication of Car Journals. W. A. Clark. (25) Jan.
 Riveting in Steel Car Construction.* H. A. Hatfield. (25) Serial beginning Jan.
 Sanitary Drinking Fountain for Passenger Cars.* (15) Jan.
 2-10-0 Simple Expansion and Compound Locomotives, Swiss Federal Railways.* (21) Jan.
 Steam Locomotives of To-day. (Report of Sub-Committee, Am. Soc. of Mech. Engrs.) (55) Jan.
 Steel Coaches for the Santa Fé.* (25) Jan.
 A Study of Spring Rigging Design.* J. P. Shamberger. (25) Jan.
 1500 Horse Power Locomotive for the Midi Railway.* (11) Serial beginning Jan. 1.
 Baggage-Buffer Cars for the Union Pacific R. R.* (18) Jan. 2.
 Coaling and Sanding Station on the Virginian Railway at Elmore.* F. F. Harrington. (14) Jan. 2.
 Developments with Steel Ties on the Bessemer & Lake Erie R. R.* (18) Jan. 2.
 Electrification of the Puget Sound Lines of the Chicago, Milwaukee & St. Paul Railway.* (111) Jan. 2; (13) Jan. 7; (18) Jan. 16; (19) Jan. 23.
 New Locomotive Repair Shops of the Chicago & Alton R. R. at Bloomington, Ill.* (18) Serial beginning Jan. 2; (15) Jan. 8.
 The Salt Lake & Utah Railroad.* (17) Jan. 2.
 Lining Long Tunnels and Tunnels Subjected to Heavy or Eccentric Ground Pressure.* E. Lauchli. (96) Jan. 7.
 A Simple Form for Earthwork Computations.* E. F. Verplanck. (13) Jan. 7.
 Beam-Light Signals on the Pennsylvania.* (15) Jan. 8.
 Combination Through Classification and Terminal Yard. W. C. Copley. (15) Jan. 8.
 Earthworks.* G. Bertram Hartfree. (104) Jan. 8.
 Extension of the Bakerloo Tube.* (12) Serial beginning Jan. 8.
 Mechanical Stokers on American Locomotives. (12) Serial beginning Jan. 8.
 The Simple Train Staff.* (15) Jan. 8.
 British-Built Four-Cylinder Express Locomotive for the São Paulo Ry., Brazil.* F. C. Coleman. (18) Jan. 9.
 Electrical Operation of the B. A. & P. Ry.* J. B. Cox. (82) Jan. 9.
 Motor Trucks and Trailers in Freight Houses. (14) Jan. 9.
 Rolled and Forged Steel Pistons.* W. W. Scott, Jr. (Paper read before the Ry. Club of Pittsburgh.) (18) Jan. 9.
 Electric Train Staff on the Canadian Pacific.* E. S. Taylor. (15) Jan. 15.
 Gasolene Switching Locomotive.* (15) Jan. 15.
 Locomotive Tests on the Chicago & North Western.* (15) Jan. 15.

* Illustrated.



Railroads—(Continued).

- St. Paul and Oregon-Washington Joint Terminals in Spokane; Extensive Grade Separation Work Required to Reach Passenger and Freight Stations in Heart of City.* (15) Jan. 15.
- Smoke Exhauster for the St. Paul Engine House at Chicago.* W. S. Lacher. (15) Jan. 15.
- Tank Locomotive for the Great Central Railway.* (11) Serial beginning Jan. 15.
- The Alaskan Railroad Surveys.* D. L. Reaburn. (13) Jan. 21.
- An Automatic Cab-Signal System for Stopping Trains.* (13) Jan. 21.
- Burned-Clay Ballast. (13) Jan. 21.
- Canadian Railway Development in 1914. (96) Jan. 21.
- Interlocking at North Philadelphia.* W. M. Post. (15) Jan. 22.
- Pacific and Mikado Type Locomotives for the New Orleans & Northeastern.* (15) Jan. 22.
- Construction of the Hailstead Cut-Off, D., L. & W. R. R.* (18) Serial beginning Jan. 23.
- Gunite Concrete Encasement, Chicago, Rock Island & Pacific Ry.* (18) Jan. 23.
- Highway-Crossing Protection.* (17) Jan. 23.
- Justifiable Expenditure for Tie Treatment. Harrington Emerson and T. T. Bower. (Abstract of paper read before the Am. Wood Preservers' Assoc.) (14) Jan. 23.
- Mechanical Life of Ties as Affected by Ballast. Earl Stimson. (Abstract of paper read before the Am. Wood Preservers' Assoc.) (14) Jan. 23; (18) Jan. 23.
- Sill Ties, Treated or Untreated Timber or Concrete? F. J. Angier. (Abstract of paper read before the Am. Wood Preservers' Assoc.) (14) Jan. 23.
- Steel Tie Construction in Electrically Warmed Concrete.* Julian M. Bamberger. (17) Jan. 23.
- A Comparison of the Old and New Lines of the Canadian Pacific at Rogers Pass, B. C. (15) Jan. 29.
- Fuel Economy on the Great Western.* (15) Jan. 29.
- Standardization of Methods in the Railroad Shop. Ernest Cordeal. (9) Serial beginning Feb.
- La Nouvelle Gare Badoise, à Bale (Suisse).* (33) Dec. 15.
- Installation pour le Lavage à Chaud des Locomotives et le Chauffage du Dépôt de Machines de la Gare de Turin.* P. Calfas. (33) Jan. 16.
- Le Projet de Raccordement entre les Gares de Cornavin et des Eaux-Vives à Genève.* (33) Jan. 16.
- Stützmauern aus Eisenbeton.* H. W. K. Ziesemer. (80) Serial beginning Oct. 8.
- Die Tragkraft des Zusammenhaltes der Erde.* A. Francke. (102) Serial beginning Oct. 15.
- Die Hartholzverdübelung.* E. Biedermann. (102) Serial beginning Oct. 15.
- I C + C. IV. T. F. G.—Locomotive der südafrikanischen Eisenbahnen.* (102) Oct. 15.
- Schienenstühle auf kiefernen Schwellen.* E. C. W. van Dyk. (102) Oct. 15.
- Eisenbeton im Eisenbahnoberbau.* (80) Oct. 31.
- Ein neues Verfahren zur Reinigung der Heiz- und Rauch-Rohre von Kesselstein und Flugasche. Buckart. (102) Nov. 15.
- Der Saalwagen Nr. 510 der österreichischen Staatsbahnen.* J. Fleischmann. (102) Nov. 15.
- Formänderungen am schwebenden Schienenstosse.* H. Saller. (102) Nov. 15.
- Die natürliche Böschung von Erdarten starken Zusammenhaltes.* A. Francke. (102) Nov. 15.
- Fortschritte im Baue von Verschiebewinden.* Wintermeyer. (102) Nov. 15.
- Die Furkabahn.* (107) Dec. 19.
- Annahme hochgespannten Gleichstroms für die Elektrisierung der Chicago, Milwaukee und St. Paul-Eisenbahn.* Zehme. (41) Jan. 7.

Railroads, Street.

- The Safety First Movement: How Electric Railways Have Worked to Reduce Accidents.* (17) Jan. 2.
- Inclosed Prepayment Cars for Baltimore.* (17) Jan. 9.
- A Two-Mile Street Railway Tunnel at San Francisco; City Undertakes to Build a Tunnel under Twin Peaks. (14) Jan. 9.
- Brooklyn Bridge Subway Connection, New York City.* (14) Jan. 16.
- The Doublerolley System in Seattle.* H. J. Kennedy. (17) Jan. 16.
- Rapid Steel Erection on Third Track Work, Second Avenue Elevated, New York.* (14) Jan. 16.
- Cleveland Railway's New Repair Shops.* (17) Jan. 23.
- Flange-Bearing Track Intersections for Street Railways.* (13) Jan. 28.
- Fireproof Carhouse at Vancouver, B. C.* (17) Jan. 30.
- Versenkung eines hölzernen Kastenfangdamms beim Bau des Spreetunnels der Berliner Untergrundbahn.* Benno Stecher. (40) Oct. 10.
- Die Kabelführung städtischer Schnellbahnen.* (41) Nov. 12.
- Die Erweiterungen des Schnellbahnnetzes von Gross-New York.* Brugsch. (51) Serial beginning Jan. 6.

*Illustrated.

F

S

G

T

D

A

S

E

F

F

I

C

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

U

S

Sanitation.

- Gas-Heated Hot-Water Apparatus.* T. F. C. Patterson. (Paper read before the London and Southern District Junior Gas Assoc.) (66) Dec. 22.
- The Purification of Dairy Wastes. G. Bertram Kershaw. (104) Serial beginning Dec. 25.
- Design, Maintenance, and Operation of Plants for Treatment of Sewage. (Report of Committee of the Am. Public Health Assoc.) (96) Dec. 31.
- A Method of Testing the Efficiency of Distribution of Sewage Sprinkler Nozzles.* Edward R. Stapley. (36) Jan.
- Street Cleaning in New York. Frederick L. Stearns. (Paper read before the Municipal Engrs. of the City of New York.) (60) Jan.
- Excavating and Backfilling Sewer Trenches by Machine; Detailed Costs and Explanation of Method used in Narrow Lanes and Business Streets in Vancouver, B. C. (14) Jan. 2.
- Recommended Tests for Use in Laboratory Control of Sewage Works Operation. (Report of the Am. Public Health Assoc.) (86) Jan. 6; (104) Jan. 1; (13) Jan. 14.
- Buffalo Sewage Disposal and Water-Supply in Relation to the Pollution of the Great Lakes. (13) Jan. 7.
- Church Warmed by Cast-Iron Sectional Boiler.* (101) Jan. 8.
- Steam Disinfection for Sewage on Common Carriers; U. S. Public Health Service has Devised Apparatus for Use on Railway Coaches and Lake Vessels; Costs of Construction and Operation. (14) Jan. 9.
- Heating, Ventilation, and Refrigeration. (Report of Committee of the Am. Commercial Gas Assoc.) (66) Jan. 12.
- An Electric Sewage-Pumping Station, Audubon, N. J.* (13) Jan. 14.
- Sewage Purification at the Experimental Station of the Ontario Board of Public Health.* (From *Bulletin No. 2*, Ontario Health Board.) (96) Jan. 14.
- Multiple Flowing-Through Chambers in Imhoff Tanks.* (13) Jan. 16.
- Ozone in Ventilation. J. C. Olsen and Wm. H. Ulrich. (Paper read before the Am. Inst. of Chemical Engrs.) (19) Jan. 16.
- A Privately Financed System of Sewers. Henry W. Taylor. (14) Jan. 16.
- Summer Municipal Wastes. (14) Jan. 16.
- Baltimore Sewage Pumping Plant.* Warren O. Rogers. (64) Jan. 19.
- The Prevention of Odors at City Refuse Disposal Works. Rudolph Hering. (Paper read before the Am. Public Health Assoc.) (86) Jan. 27.
- An Ash and Refuse Dumping Board, West 77th St., North River, New York City.* C. W. Staniford. (13) Jan. 28.
- Sewage-Treatment and Garbage-Reduction Works for Akron, Ohio. (14) Jan. 28.
- Designing of Warm Air Heating Systems.* Roy E. Lynd. (Paper read before the Soc. of Heating and Ventilating Engrs.) (101) Jan. 29.
- New Methods of Pneumatic Tunneling Aid Safe and Rapid Completion of Passaic Valley Sewer Contract.* (14) Jan. 30.
- Bodenfiltration und biologische Reinigung in Worcester, Massachusetts.* Erwin Neumann. (7) Serial beginning Oct. 17.
- Ueber Luftfilter.* J. Kister und C. Finsterwalder. (7) Oct. 31.
- Untersuchung über die Vorgänge in einer Warmwasserheizung während des Anheizens.* E. Lewin. (7) Oct. 31.
- Versuchsergebnisse mit dem neuen Dampf- und Formalin-Desinfektionsapparat.* Otto Mayer. (7) Oct. 31.
- Vergleiche über Emscher-, Kremer- und Stagi-Brünnen, Neustädter Becken, biologische und chemische Klärung nach den Ergebnissen der Stuttgarter Versuchskläranlagen.* Emil Maier. (7) Serial beginning Nov. 7.

Structural.

- Proposed Revised Standard Specifications for Portland Cement Stucco on Metal Lath, Brick, Tile or Concrete Block. (110) Oct.
- Reinforced Concrete Chimney at the Burnside Shops, I. C. R. R.* A. M. Wolf. (87) Oct.
- The Work and Some Accomplishments of the Forest Products Laboratory, Madison, Wis.* Howard F. Weiss. (4) Dec.
- Permanent Magnetism of Certain Chrome and Tungsten Steels. Margaret B. Moir. (Abstract from *Philosophical Magazine*.) (73) Dec. 25.
- Shear and Problems Arising Therefrom. H. Kempton Dyson. (Paper read before the Concrete Inst.) (96) Dec. 31.
- Architectural Acoustics.* Wallace C. Sabine. (3) Jan.
- Floor Surfaces in Fireproof Buildings. Sanford E. Thompson. (Abstract of paper.) (55) Jan.
- Reinforced Concrete Factory Buildings. F. W. Dean. (Abstract of paper.) (55) Jan.
- Shear in Beams; Presentation of a General Formula and its Reduction to Special Formulas for the Common Simple Sections.* Ernst Jonson. (14) Jan. 2.
- The Model Dairy Barn.* (From the *National Builder*.) (76) Jan. 5.
- Knockdown Camp Buildings.* Charles E. Bee. (13) Jan. 7.

*Illustrated.

F

St

T

P

F

R

G

S

T

T

C

M

R

S

D

T

T

S

S

T

I

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

S

Structural—(Continued).

- The Philadelphia Ruling on the Design of Flat Slabs of Reinforced Concrete. Edwin * Clark. (13) Jan. 7.
- Piledriver with Traversing Leads for Driving Trestle Bents.* (13) Jan. 7.
- Fireproof Ice-House at Lake Hopatcong.* (14) Jan. 9.
- Paper-Covered Frames for Cold Weather Concreting.* A. A. Lane. (14) Jan. 9.
- Restoring Concrete Buildings at Edison Plant.* (14) Jan. 9; (13) Jan. 14.
- Grouting as a Method of Engineering Construction. (86) Jan. 13.
- Structural Steel Supports for Large Steam Turbines.* (13) Jan. 14.
- Tearing Down a 250-Ft. Reinforced-Concrete Chimney.* (13) Jan. 14.
- The Behaviour of Metals Under Stress.* Fred C. A. H. Lantsberry. (Paper read before the Manchester Assoc. of Engrs.) (47) Serial beginning Jan. 15.
- Comparative Exposure Test of Vehicles for Paint. Cloyd M. Chapman. (13) Jan. 15.
- Methods of Excavation for Buildings.* A. B. McDaniel. (14) Jan. 16.
- Routine Tests for Determining Strength of Mortars.* Harold Perrine. (14) Jan. 16.
- San Francisco's New Auditorium.* (111) Jan. 16.
- Design and Construction of the 435-ft. Steel Framed Tower of Jewels at the Panama-Pacific International Exposition.* Frank S. M. Harris. (86) Jan. 20; (14) Jan. 23.
- Tests for Bond and Electrolytic Corrosion of Painted Reinforcing Steel.* (13) Jan. 21.
- Test Results with Concrete Waterproofing Materials. (13) Jan. 21.
- Sheet Metal for Church.* W. A. Douglas. (101) Jan. 22.
- Suspended Beam Forms, Their Advantages and Disadvantages.* Sydney Diamant. (14) Jan. 23.
- Treated Timber for Factory Construction. F. J. Hoxie. (Abstract of paper read before the Am. Wood Preservers' Assoc.) (14) Jan. 23.
- Effect of Duration of Mixing on the Strength of Concrete. H. H. Scofield. (Paper read before the Indiana Eng. Soc.) (86) Jan. 27.
- Test of Long-Submerged Hemlock Timber.* T. R. Lawson. (13) Jan. 28.
- Wind Pressure Formulas and Their Experimental Basis. R. Fleming. (13) Jan. 28.
- Factors of Safety in Steel and Iron Parts.* W. Trinks. (62) Feb. 1.
- Note sur le Transformations Calorifiques de l'Energie du Choc. N. Davidenkoff. (93) Aug.
- Zur Berechnung der Schubspannungen in gebogenen Stäben. Siegmund Fuchs. (48) Aug. 15.
- Die experimentelle Ermittlung des Verlaufes der Stosskraft und die Bestimmung der Deformationsarbeit beim Stauchversuch.* H. Seehase. (48) Aug. 22.
- Untersuchungen über die Wirkung von Anfangsspannungen in Nieten und Schrauben.* H. Kayser. (48) Sept. 19.
- Das neue Haus des Vereines deutscher Ingenieure in Berlin.* (48) Oct. 10.
- Bindung zwischen Asphalt und Beton.* (80) Oct. 17.
- Die technischen Einrichtungen der Grossmarkthalle in München.* Karl Hauser. (48) Oct. 17.
- Neuere Versuche über elastische Hysterese.* R. Grammel. (48) Nov. 28.
- Oct. 24.
- Untersuchungen über die Wärmeleitfähigkeit feuerfester Baustoffe.* E. Heyn. (80) Oct. 29.
- Betonarbeiten bei Frost.* (80) Nov. 14.
- Der Wellblechstoss.* H. Nitzsche. (48) Nov. 14.
- Neuere Versuche über elastische Hysterese.* R. Grammel. (48) Nov. 28.
- Eine eigenartige Eisenbetonpfahlgründung.* H. Schürch. (78) Serial beginning Dec. 5.
- Der Ermittlung der ungünstigen Laststellung auf graphischem Wege.* Eduard Kreitmeyer. (78) Dec. 5.
- Der Getreidespeicher der Aktien-Gesellschaft Lehnkering & Cie. zu Duisburg.* E. Rossmann. (78) Dec. 5.
- Die Tragkonstruktionen des Rathaus-Neubaues in Mülheim a. d. Ruhr.* Pappit. (51) Serial beginning Sup. No. 1, 1915.
- Die Ausnutzung des Materiales in gelochten Körpern.* A. Leon und R. Zidlicky. (48) Jan. 2.
- Der Neubau der Markthalle in Karlsbad.* Franz Drobny. (78) Jan. 4.
- Stoffträger aus Eisenbeton.* Willy Obrist. (78) Jan. 4.

Topographical.

- Lake Traverses on Railroad Preliminary Work. J. A. Macdonald. (14) Jan. 9.
- The Underground Survey of Cincinnati; Methods and Costs of Locating and Mapping Subsurface Structures Preliminary to Installing New Sewerage System.* O. E. Carr. (14) Jan. 9.
- Permanent Survey Stations.* John H. Eggers. (103) Jan. 23.

*Illustrated.

E
V
C
4
7
1
1
1
1
1

Water Supply.

- Coon Rapids Low Head Hydro-Electric Development on the Mississippi River Near Minneapolis, Minnesota.* J. W. Link, M. Am. Soc. C. E. (4) Dec.
- 48-Inch Cast-Iron Force Main for Atlantic City, New Jersey.* L. Van Gilder. (59) Dec.
- The Growing Value of Ground Water Supplies. L. J. Le Conte. (59) Dec.
- Laboratory Control of Water Supplies.* Edward Bartow. (59) Dec.
- Legal Decision in a Water Supply Pollution Case. J. Walter Ackerman. (59) Dec.
- New Intake Tower and Tunnel at the St. Louis Water-Works. Edward C. Davis. (Paper read before the Engrs.' Club of St. Louis.) (1) Dec.
- Note on Ortho-Tolidin Test for Free Chlorine. W. F. Montfort. (59) Dec.
- Notes on the Contamination of a Drinking and Railroad Water Supply by Sea Water and the Removal of the Salt Water from the Reservoir. John R. Downes. (59) Dec.
- Some Relations Between the Water Supply and Typhoid Fever in Washington, D. C.* John Gaub. (59) Dec.
- Hydro-Electric Power Plant in Chile.* R. E. Graham Clark. (12) Dec. 25.
- Service Reservoir Construction.* E. R. Matthews. (11) Dec. 25.
- The Norfolk Experimental Rapid Sand Filter Plant.* J. G. C. Christie. (36) Jan.
- Percolation and Upward Pressure of Water.* W. A. Mitchell. (100) Jan.
- The Whitton Pumping Station, Ipswich Corporation Waterworks. Charles W. S. Oldham. (104) Jan. 1; (66) Jan. 19.
- Electrically Operated Contractor's Plant for Building Kensico Dam.* A. W. Carroll. (14) Jan. 2.
- Cleveland West Side Water Supply Tunnel.* (13) Jan. 7.
- Dam and Log Slide, High Falls, Que.* Jos. Percy McRae. (96) Jan. 7.
- Pipe-Thawing Motor Truck of the Columbus Water-Works.* (13) Jan. 7.
- Hydroelectric Development at Rumford, Maine.* (27) Jan. 9.
- Los Angeles Aqueduct Mistakes.* F. C. Finkle. (111) Jan. 9.
- Water Turbine Characteristics; Method of Obtaining Characteristic Curves for High-Power, High-Speed Wheels, and Explanation of Their Application.* George H. Bancroft. (14) Jan. 9.
- Scraping a Fifteen Inch Trunk Main at Batley.* J. C. Barrowclough. (Paper read before the Institution of Water Engrs.) (66) Jan. 12.
- Design and Construction of the New Supply Conduit (Nepang) of the Hartford, Conn., Water-Works. (86) Jan. 13.
- The City Tunnel of the Catskill Aqueduct.* Walter E. Spear. (13) Serial beginning Jan. 14.
- Excavation for Foundation of Elephant Butte Dam.* E. H. Baldwin. (13) Jan. 14.
- The Inverted Weir.* E. W. Rettger. (13) Jan. 14.
- New Waterworks at Madras.* (12) Serial beginning Jan. 15.
- Water-Softening by the Lassen-Hjort and the Permutit Processes.* (11) Jan. 15.
- Chicago's New Tunnel and Pumping Station, Part of Comprehensive Waterworks Plan.* Horace S. Baker. (14) Serial beginning Jan. 16.
- Development of Water Power on Public Lands. (14) Jan. 16.
- Special Venturi Meter for Irrigation Water Measurement.* (86) Jan. 20.
- Canadian Water Power.* (96) Jan. 21.
- Direct-Driven and Geared Centrifugal Pumps, Ross Pumping Station, Pittsburgh.* (13) Jan. 21.
- Hydro-Electric Power Development at Cedar Rapids, Que.* (96) Jan. 21.
- Leakage from Cedar Lake Reservoir, Seattle Water-Supply.* Charles Evan Fowler. (13) Jan. 21.
- Placing Concrete in Reservoir Walls by Compressed Air, Montreal.* (13) Jan. 21.
- Rapid Water Main Construction, Medicine Hat, Alberta.* (96) Jan. 21.
- The Cleaning of Water Mains.* J. F. Springer. (46) Jan. 23; (60) Jan.
- Decay of Wood Pipes. (14) Jan. 23.
- Bacteriological Standard for Drinking Water Supplied by Common Carriers. (From Report of Comm. of the Treasury Department.) (86) Jan. 27.
- Design and Structural Details of Concrete Lining for Irrigation Canals.* Samuel Fortier. (86) Serial beginning Jan. 27.
- General Principles Governing the Relocation and Mapping of Uncharted Portions of Water Distribution Systems. Carleton E. Davis. (Paper read before the Am. Assoc. for the Advancement of Science.) (86) Jan. 27.
- Irrigation by Pumping at Del Rio, Texas, Detailed Description of Plant with Special Reference to Design and Operation of First Large American Humphrey Gas Explosion Pump.* Alexander Potter. (86) Jan. 27.
- Notes on Representative Iowa Water Supplies. John H. Dunlap. (From *University Extension Bulletin No. 8*, Iowa Univ.) (86) Jan. 27.
- A Study of the Failures and Partial Failures of Dams in Pennsylvania. (86) Jan. 27.
- The First Large American Humphrey Pump.* C. C. Trump. (13) Jan. 28.
- Lining the St. Louis Water Tunnel with Concrete by Means of Compressed Air.* E. C. Davis. (13) Jan. 28.

*Illustrated.

F

W

P

C

V

N

V

L

E

V

L

U

I

F

U

I

V

A

I

I

C

V

C

Water Supply—(Continued).

- Puntledge River Power Development.* (96) Jan. 28.
 Construction of Cumberland Waterworks.* Frank H. Eastman. (14) Jan. 30.
 West Fork Waterworks Dam at Fort Worth; Combined Earth and Concrete Dam.* (14) Jan. 30.
 Neuere selbsttätige Stauanlagen der Stauwerke A.-G. in Zürich.* Schleusner. (48) Aug. 8.
 Wasserturm aus Eisenbeton.* (80) Oct. 10.
 Die Turbinen der A.-S. Rjukanfos und deren Untersuchung.* Ernst Reichel. (48) Serial beginning Oct. 31.
 Erddamm oder Mauer als Abschlusswerk für Staubecken.* Wolf. (40) Oct. 31.
 Wasserturm für die Stadt Emden.* Zander. (40) Nov. 7.
 Die Destillation des Zusatzwassers in Kraftwerken.* Hugo Schröder. (48) Nov. 7.
 Ueber Grundwasser- und Quellentemperatur.* Chr. Mezger. (7) Serial beginning Nov. 14.
 Die Queistalsperre bei Markklissa.* A. Deventer v. Kunow. (39) Nov. 20.
 Hochbehälter für 150 cbm Nutzinhalt.* F. Knispel. (80) Nov. 21.
 Ueber Metall- und Eisenbetonrohre. P. Rohland. (40) Nov. 25.
 Die Wasserturbinen und deren Regulatoren an der Schweiz. Landesausstellung Bern, 1914.* Franz Präsil. (107) Serial beginning Dec. 12.
 Der Ausbau von Pyrenäen-Wasserkraften zur Versorgung der Stadt Barcelona und der Provinz Catalonien mit elektrischer Energie.* A. Paul. (48) Serial beginning Jan. 9.

Waterways.

- Action of Water in Locks of the Panama Canal.* H. F. Hodges. (100) Jan.
 The Huai River Conservancy Project.* (100) Jan.
 Hindia Dam on the Euphrates River.* (14) Jan. 2.
 Municipal Steamboat Landing at Peoria, Ill.* (13) Jan. 7.
 The Balboa Docks.* (46) Jan. 9.
 Excavating Plant for Heavy Drainage Work in Arkansas.* (14) Jan. 9.
 Methods of Creating and Maintaining Channels at Mouths of Fluvial and Tidal Rivers. Elmer L. Corthell. (14) Jan. 9.
 Certain Cost Data on the Work of Improving the Neponset River in Massachusetts.* Edmund M. Blake. (86) Jan. 13.
 The Collection and Use of Stream Discharge Data in Pennsylvania.* R. A. Boehringer. (14) Jan. 23.
 Steamship Terminal in the Bronx.* (46) Jan. 23.
 The Engineer's Interest in Deep Waterways, with Special Reference to the Mississippi River and Its Tributaries. Harry N. Wagner. (Paper read before the Am. Assoc. for the Advancement of Science.) (96) Jan. 28.
 Electric Towing, Locomotives Chief Feature in Operation of Panama Canal.* (14) Jan. 30; (13) Jan. 28; (15) Jan. 29; (27) Jan. 30; (17) Jan. 30; (19) Jan. 30.
 Fighting the Sea with Compressed Air.* Robert G. Skerrett. (46) Jan. 30.
 Preliminary Estimating of Canal Excavation.* Lewis M. Hammond. (14) Jan. 30.
 Das Hochwasserschutzgesetz für Ohio.* Kenneth C. Grant, M. Am. Soc. C. E. (40) Nov. 21.
 Der Bau des neuen Weserwehres bei Dörverden.* F. W. Schmidt. (40) Nov. 28.
 Die Verwendung von Drahtwalzen mit Klaubsteinfüllung im Flussbau.* Karl Perl. (33) Jan. 8.

*Illustrated.